SLICE6 AIR DAS
User's Manual

September 2024

13006-90440-MAN (Rev. 4)

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DTS Support

SLICE systems are designed to be reliable and simple to operate. Should you need assistance, DTS has support engineers worldwide with extensive product knowledge and crash test experience to help via telephone, e-mail or on-site visits.

The best way to contact a DTS support engineer is to submit a request through the DTS Help Center web portal (support.dtsweb.com). You must be registered (support.dtsweb.com/registration) to submit a request (https://support.dtsweb.com/hc/en-us/requests/new). Registration also enables access to additional self-help resources and non-public support information.

This manual supports the following products:

- 13006-90441: SLICE6 AIR DAS Module (Beta) (retired)
- 13006-90442: SLICE6 AIR DAS Module
- 13006-90490: SLICE6 AIR 4-module Rack (DS-4) (retired)
- 13006-90680: SLICE6 AIR DAS Module (chassis isolated)
- 13006-90740: SLICE6 AIR DAS Module – Ethernet Recorder (EDR)
- 13006-90800: SLICE6 AIR 4-module Rack (DS-4)
- 13006-90801: SLICE6 AIR 4-module Rack (DS-4) (chassis isolated)
- 13006-90910: SLICE6 AIR DAS Module, 5000 g

Introducing the SLICE6 AIR DAS

SWaP optimized, the SLICE6 AIR DAS is a complete data acquisition unit for measuring analog signals in extreme environments such as payload ejection/deployment; in-flight/on-board UAVs/drones, rockets, missiles and munitions; and biomechanics. PTPv2 Ethernet communications with on-board data storage to flash memory are supported. Each module includes 6 sensor input channels and can be used standalone or interconnected/networked for high channel-count systems.

- Sample rates up to 400,000 sps on 6 channels simultaneously via record-in-place.
- Real-time data streaming up to 20,000 sps per channel.
- Shock rated to 500 g for dynamic testing environments (5000 g optional).
- 6-channel analog sensor interface supports accelerometers, load cells, pressure sensors, strain gage and piezo-resistive bridges, IEPE and voltage inputs.
- Ethernet PTPv2 communications (IEEE 1588) and sensor ID easily support test set-ups of hundreds of channels.
- Optional time source synchronization using IRIG-B122 and GPS/1PPS standards.
- LED indicators for system and power status.

Connector information, pin assignments and mechanical specifications can be found in Appendix A. Common sensor wiring schematics are shown in Appendix C. Please see your packing list for your hardware's specifications.

SLICE6 AIR DAS Module (chassis isolated)

This DAS module is typically used in airborne or space applications where isolated electromagnetic return paths or single point grounding methods are used to mitigate unwanted noise. Both the DAS and DS-4 must include chassis isolation for a fully isolated system.

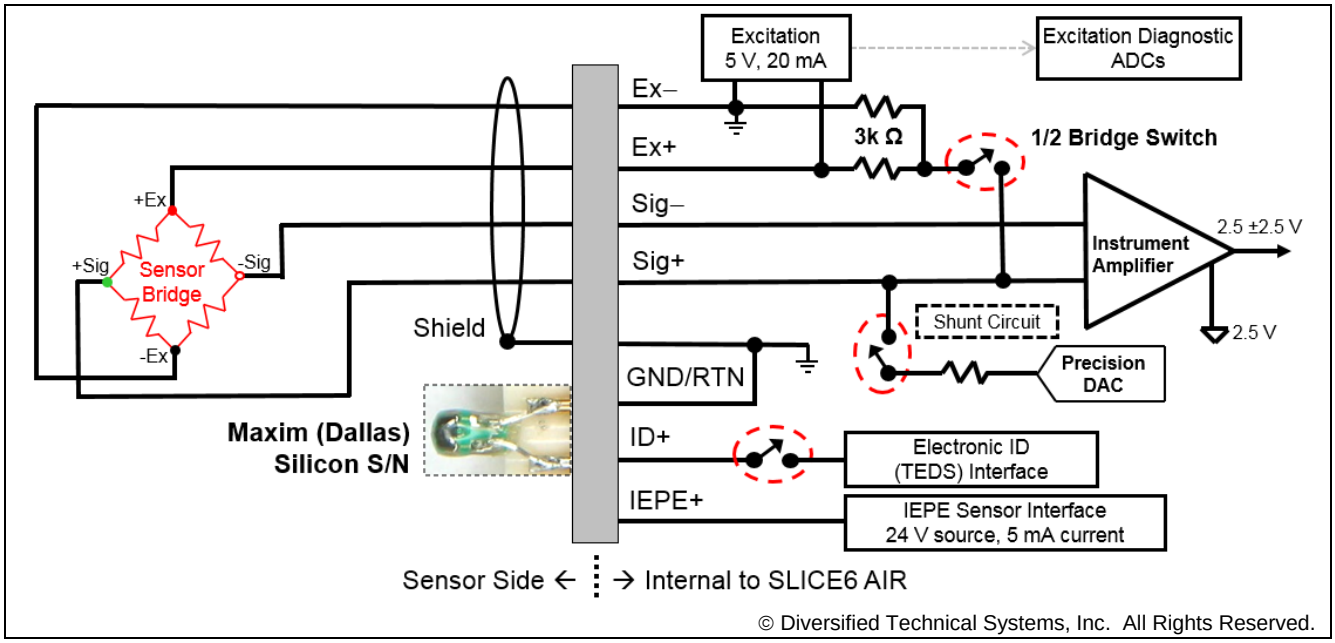
An ungrounded symbol next to the System connector identifies this specification.

SLICE6 AIR DAS Module - Ethernet Recorder (EDR)

The SLICE6 AIR Ethernet Recorder module is a SLICE6 AIR DAS module with firmware that supports recording Ethernet traffic (up to 10 Mbps UDP) instead of analog (sensor) data. DataPRO version 3.4 or greater is required. Details for its use can be found on the Help Center here and here. (This is not user configurable. Contact DTS for more information.)

Sensor Interface

The SLICE6 AIR DAS supports 6 sensor measurement channels via the 51-pin, micro-D sensor interface connector. See Appendix A for sensor connector pin assignments.



SLICE6 AIR DAS Sensor Interface

Supported Sensor Types

The SLICE6 AIR DAS supports many types of sensors including accelerometers, load cells and pressure sensors. The following general sensor types are supported:

- Full- bridge (4-wire) or half-bridge (3-wire) resistive and piezo-resistive sensors,
- IEPE sensors,
- Conditioned sensors with 5 V excitation and an output voltage of 0-5 V.

For additional questions regarding supported sensors, please contact DTS and provide the sensor manufacturer and model number, if available. For specific implementation schematics, see Appendix C.

Input Range

The nominal sensor input range for bridge and piezo-resistive sensors is 0-5 V[1] (2.5 V center with respect to -Ex) at a gain of 1. The sensor input range for IEPE sensors is 0.5-23.5 V. At higher gains, the maximum range decreases correspondingly. For example, at a gain of 10, the input range is ±240 mV. (The software will automatically calculate the gain based on the user-specified input range and other sensor parameters.)

[1] Larger ranges supported with range expander cable. Contact DTS for more information.

Excitation Sources

Bridge excitation sources are fixed and independently current limited at 5 V, 20 mA. IEPE excitation is supported with a constant current of 5 mA with a source voltage of 24 V.

Excitation sources are not enabled until the software initializes the system during diagnostics.

Bridge Completion

Half-bridge emulation for any channel may be selected via software. Half-bridge transducers should be connected to ±Ex and -Sig.

Hardware Filters

Each measurement channel has a fixed-frequency, 50 kHz, 4-pole and an adjustable 5-pole Butterworth anti-aliasing filter supporting 1 Hz-40 kHz. Should you have any questions regarding the best filter option for your application, please contact DTS.

Offset Compensation

Each channel can compensate for a sensor offset of up to 100% of the full-range output of a sensor. The sensor offset is measured and the hardware compensation is adjusted during the diagnostic check. Please see the software manual for additional information.

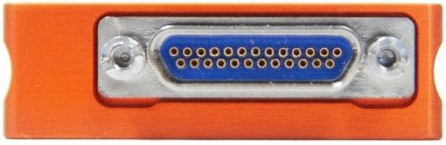
Electronic Identification (EID)

Each measurement channel supports communication with silicon serial number devices manufactured by Dallas Semiconductor/Maxim Integrated Products (1-wire devices such as DS2401 and DS2431). When an ID chip is connected to the proper pins on the sensor connector, the software can automatically read these devices and correlate the serial number to channel set-up information stored in the sensor database.

Shunt Emulation

The SLICE6 AIR DAS contains a shunt emulation circuit, effectively eliminating the need for conventional shunt resistors to perform shunt checks. When "Emulation" is chosen as the shunt calibration method, the software injects a precisely calculated current into the sensor to create an expected deflection of the sensor's output. Expected versus actual deflection are compared to validate that the channel is working properly. Please see the software manual for additional information.

System Connector



All communications, control signals and input power are provided via the 25-pin, micro-D system connector. Using a SLICE6 AIR Chain Module, DS-4 or other interface, multiple units can be interconnected (daisy-chained) for hundreds of test channels.

When interconnecting DAS modules or DS-4 units, power and control signals are generally connected in parallel and Ethernet signals are connected in series. Cable quality may affect performance and maximum length (~10 m for Ethernet). Information on Ethernet chaining is on page 31. See Appendix A for pin assignments.

Contact DTS if you have any questions about using multiple systems in your test environment.

Communication Methods

SLICE6 AIR DAS support Ethernet IEEE 1588 PTPv2 communications. Communication is enabled after the initialization sequence has completed (~15 s after sufficient power and ON signal is applied[2]). (Note network congestion may slow IP address acquisition.)

Timing Synchronization

The SLICE6 AIR DAS supports system-wide, channel-to-channel, time source synchronization by operating as a slave device or master clock via end-to-end (E2E) communications using a variety of protocols:

- IEEE 1588 PTPv2,
- UART-based GPS/1PPS[3, 4],
- IRIG-B122/B022.

When operating as a PTP master clock, SLICE6 AIR DAS communicates with slave units to provide clock synchronization. When operating as a slave unit, the DAS synchronizes its internal clock with the grandmaster/master clock.

UDP, IRIG-106 Chapter 10 and IENA

Both record-in-place and data streaming support IRIG-106 Chapter 10 compliant formats. General information on record-in-place and data streaming using the IRIG time code standardization protocol can be found on the Help Center here. Please see the DataPRO software manual for additional information, including how to create a test set-up.

[2] For static IP.
[3] Additionally, serial data (RS232 or RS422) from an external GPS source can be recorded. See page 31 for connections.
[4] When UART recording modes are used, 50% of the available memory is reserved for UART and 50% is available for recording (analog) data. (Note: UART and GPS baud rates should be the same.) General information on software set-up for GPS can be found on the Help Center here.

In-place data recording is supported to up 400,000 sps per channel and includes an additional timestamp and TMATS data to permit re-creation of Chapter 10 data during post-processing.

Real-time data streaming via UDP multicast or unicast is supported up to 20,000 sps per channel using these methods:

- PCM data streaming via standard or SuperCom supporting time formats 1 and 2,
- Analog formats and TMATS supporting time formats 1 and 2,
- TmNS data streaming with PCM SuperCom payload,
- IENA with position parameter.

IRIG-B Channel 10 UDP streaming set-up information can be found on the Help Center here. General information on software set-up for data streaming with NetView and FLIDAS can be found on the Help Center here.

Power Management

The SLICE6 AIR DAS and DS-4 do not contain an internal battery and must be connected to external power at all times for operation. Without external power applied, the DAS is in a power off state. The DS-4 is a passive device that supports pass-through power only.

When the DAS is on (sufficient power and ON signal applied), power consumption depends largely on the connected sensor load, whether the unit is armed and the number of modules in use.

	Power Consumption (on 1588 network) per SLICE6 AIR DAS*		
Input Voltage	**Idle**	**IEPE off; Armed and Recording**	**IEPE on; Armed and Recording**
9-30 VDC[5, 6]	<1.5 W	<2.7 W	<3.3 W

* When using a DS-4, multiply power consumption by the number of DAS modules in use.

Power Supply Considerations

A good power source is of paramount importance. SLICE6 AIR systems should be powered from a high-quality power supply. Be sure to consider any power drop due to cable length.

When selecting a power supply, consider the following:

- The higher the supply voltage, the more immune to noise the DAS is.
- The lower the noise (<100 mV p-p), the quieter the DAS performance.[7]
- The power supply should be able to provide >5 W under load per DAS module.

Use of a DS-4 provides some protection from external noise.

[5] Reverse polarity protected.
[6] Commercially-available 9 V batteries should not be used.
[7] Aircraft power (28 V, 1.5 V ripple) is acceptable but may affect DAS noise performance slightly.

Power-up and Power-down Procedures

When sufficient power is applied, the SLICE6 AIR DAS will power up (on, idle and communication enabled) if an ON signal is present. With power applied but the ON signal absent, the unit is off. Power up (On state) occurs in ~15 s, after which communication is enabled.

Power down of the DAS is immediate upon removal of either the ON signal or external power. Wait ~30 s before reinitializing the DAS.

LEDs

The SLICE6 AIR DAS has two LED indicators that show system and power status.

Status (STS) LED

The status LED indicates communication and arm status and is red, green or blue. At system power up, the LED cycles from red to green to blue followed immediately by the power LED boot-up sequence.

Condition	STS
Power up	
Communicating with PC	
Recording Data (Recorder Mode) -or- Armed (Circular Buffer) -or- Real-Time Streaming	
Armed in Recorder Mode	
Unit received Event	
Idle	

- When the unit is not armed, the status LED will blink green when handling a command from the PC.
- For Recorder Mode:
  - When the unit is first armed, the LED will go solid blue to indicate that it is waiting for the START RECORD signal but not taking data.
  - When it receives the START RECORD signal, the LED will turn green to indicate that it is actively recording data.
  - The LED will turn off when data collection has completed.
  - If an EVENT signal is received while the unit is recording data, the LED will turn red and then turn off when data collection has completed.
- For Circular Buffer Mode:
  - When the unit is armed, the LED will go solid green to indicate that it is collecting data and waiting for the EVENT signal.
  - When an EVENT signal is received the LED will turn red and then turn off when data collection has completed.

Power (PWR) LED

The power LED is red, green or blue.

Condition	PWR
Power up	
Connected to host	
Power up; not connected to host (time synchronization is disabled[8])	
DAS synchronized with time input source[8]	(0.5 Hz)
Power fault (input power out of range) (time synchronization is disabled[8])	
DAS out of synchronization with time input source[8]	(0.5 Hz)

- At power up, the LED cycles from red to green to blue immediately after the status LED has completed its boot-up sequence.
- When connected to host, the LED will turn blue.
- At power up but not connected to host, the LED will turn green.
- When input power is too high or too low, the LED will turn red.

[8] G0N5 firmware version or later.

Data Memory Size

With 15 GB of flash memory available for data storage, the SLICE6 AIR DAS can record ~52 minutes of data at the maximum sampling rate (6 channels at 400,000 sps). Since the recording capacity is very large, it is generally best to limit sampling rates and event durations to the minimum necessary to avoid large and cumbersome data files. Large files take longer to download and may also be time-consuming to post-process or difficult to share. Use of the Region of Interest (ROI) download can save a great deal of time if implemented properly.

Sampling Rates

User-selectable sampling rates are available from 50 sps to 400,000 sps.

# of Channels*	Maximum Sampling Rate (per channel)
6	400,000 samples per second (sps) via record-in-place
	20,000 sps via data streaming
	10,000 sps via data streaming + record-in-place

* All channels are recorded even if they are not programmed.

With 15 GB available for data storage[9], there are 7,500 M samples available (1 sample = 2 bytes). To determine the maximum recording time, divide the number of samples by the product of the sampling rate and the number of channels.

$$\frac{7{,}500{,}000{,}000}{\text{Sampling rate (sps)} \times \text{\# of channels}} = \text{\# of seconds}$$

Example: 6 channels of data at 400,000 sps

$$\frac{7{,}500{,}000{,}000}{400{,}000 \times 6} = 3{,}125 \text{ sec (52 minutes)}$$

Circular Buffer Limitations

Due to the nature of flash memory, the system cannot be armed in *Circular Buffer* mode indefinitely. To determine the maximum time available, use the equation below:

$$0.8 * \text{recording time} = \text{maximum time available in } \textit{Circular Buffer} \text{ mode}$$

Example: $0.8 * 3{,}125 \text{ sec} = 2500 \text{ sec (41 minutes)}$

In this example, the test must occur within 41 minutes, after which time the unit stops recording data.

[9] When UART recording modes are used, 50% of the available memory is reserved for UART and 50% is available for recording (analog) data.

SLICE6 AIR DS-4

The SLICE6 AIR DS-4 is a passive device that supports communications, control signals and pass-through power via a 26-pin, high-density, D-sub connector. Multiple DS-4 units can be interconnected (daisy-chained) for hundreds of test channels.

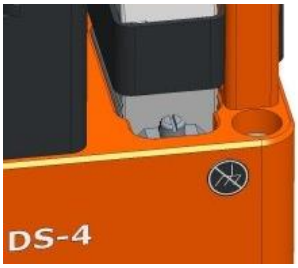
When interconnecting DAS modules or DS-4 units, power and control signals are generally connected in parallel and Ethernet signals are connected in series. Cable quality may affect performance and maximum length (~10 m for Ethernet). Connector information, pin assignments and mechanical specifications can be found in Appendix A. For power requirements, please see page 10. Information on Ethernet chaining is on page 31.

Contact DTS if you have any questions about using multiple systems in your test environment.

WARNING:

Testing using the DS-4 should only be performed with the DAS retainer cap securely fastened (6.6 in-lb).

Chassis Isolation



This DS-4 is typically used in airborne or space applications where isolated electromagnetic return paths or single point grounding methods are used to mitigate unwanted noise. Both the DAS and DS-4 must include chassis isolation for a fully isolated system.

An ungrounded symbol next to the 26-pin connector identifies this specification.

Basic Care and Handling

SLICE6 AIR systems are precision devices designed to operate reliably in dynamic testing environments. Though resistant to many environmental conditions, care should be taken not to subject the units to harsh chemicals, submerge it in water, or drop it onto any hard surface.

WARNING:

Electronic equipment dropped from desk height onto a solid floor may experience up to 10,000 g. Under these conditions, damage to the exterior and/or interior of the unit is likely.

Your SLICE6 AIR DAS module is supplied with calibration data from the factory. DTS recommends annual recalibration to ensure that the unit is performing within factory specifications. The SLICE6 AIR DAS and DS-4 are not user-serviceable and should be returned to the factory for service or repair.

Shock Rating

The SLICE6 AIR DAS and DS-4 are rated for 500 g, 4 ms half-sine duration, in all axes. (A 5000 g option for the SLICE6 AIR DAS module is available.)

WARNING:

Testing using the DS-4 should only be performed with the DAS retainer cap securely fastened (6.6 in-lb).

Mounting Considerations

SLICE6 AIR equipment should be bolted securely to the test article or dynamic testing device to provide the best shock protection. Mounting methods and hardware selection should be carefully calculated to withstand expected shock loading and facilitate proper grounding. Check bolt tightness periodically to ensure that the unit is securely fastened to the testing platform.

DTS strongly recommends that all equipment be properly grounded to minimize any risk of data noise due to high-current transients. The test article or dynamic testing device should be connected to earth ground. SLICE6 AIR equipment should be grounded to each other and bolted to the test article. DTS recommends checking continuity between the enclosures of each unit to confirm resistance readings of <1 ohm.

Thermal Considerations

The SLICE6 AIR DAS and DS-4 are low power devices and it is unlikely that self-heating will be an issue in real-world testing if proper mounting methods are observed. Never mount the equipment to a thermally non-conductive surface like wood or plastic. ALWAYS use a heat

sink if you are not mounting the system to a structure that will serve this purpose. Should you have any questions about using SLICE6 AIR in your environment, please contact DTS.

Environmental Rating

The SLICE6 AIR DAS module is IP64 rated. The DS-4 and all accessories are not IP rated.

6 (solid ingress) = totally protected against dust;
4 (liquid ingress) = the enclosure is protected against splashing water from any direction.

Care should be taken to prevent prolonged exposure to any potentially harmful environment. Units should be cleaned, dried and inspected after exposure to any environment that could cause damage.

Software

DataPRO software is used with SLICE6 AIR systems. PC specifications are:

- Windows 7 and later (32- and 64-bit versions are supported),
- Microsoft .NET Runtime version 4.5.2,
- MS Access ODBC drivers (usually included with Microsoft Office),
- i5 processor minimum; i7 processor recommended,
- 8 GB RAM minimum; 16 GB RAM recommended (more RAM is important for high channel counts and longer/higher sample rates),
- 1 GB disk space for software plus additional storage for test data,
- 1366 x 768 minimum screen resolution; 1920 x 1080 recommended.

Additionally, DTS recommends a network that supports gigabit Ethernet (GbE).

Data Collection Concepts

The discussion below provides a general introduction to data collection. Please see the software manual for a detailed discussion and implementation specifics.

The SLICE6 AIR DAS is a standalone data logger. Once the system is armed, the PC can be disconnected if desired. After receiving a Start Record or Event signal, SLICE autonomously collects data, storing it to flash memory with no user interaction. After the test, the user reconnects the PC to download the data.

There is also a real-time mode in the control software that allows the user to check channel inputs on an oscilloscope-looking screen. (This data can be logged.)

Data Collection Modes

The SLICE6 AIR DAS supports 4 data collection modes: Circular Buffer, Recorder, Hybrid Recorder, and Continuous Recorder. (Note: The software cannot simultaneously display the data while the system is recording.)

Circular Buffer Mode

Using Circular Buffer mode, the user can program the SLICE6 AIR DAS to record pre- and post-Event data. Time Zero (T=0) is marked when the Event signal is received.

Due to the nature of flash memory, the system cannot be armed in Circular Buffer mode indefinitely. Please see page 14 for information on how to calculate data storage duration when using Circular Buffer mode.

Recorder Mode

Data collection begins when a Start Record signal is received and continues for the time specified in the test set-up. If an Event signal is received sometime after the Start Record signal, this is marked as T=0.

Hybrid Recorder Mode
Data collection begins when a Start Record signal is received and continues until the unit receives an Event signal. The unit then records for the post-Event time specified by the user. The Event signal marks the T=0 point and all data recorded is available for download.

Continuous Recorder Mode
Data collection begins when a Start Record signal is received and continues until the Start Record signal is released. The unit will then re-arm for another event. The LEDs on the unit will flash blue slowly then rapidly, and then the status LED will become solid blue, indicating the unit is fully armed. The unit will continue to record new events until it records the number of events specified by the user. If an Event signal is received after the unit has re-armed, the unit will disarm and no longer attempt to re-arm.

NOTE:

An event or trigger signal applied anywhere in the SLICE6 AIR DAS chain is distributed throughout the chain.

Start Record and Event Initiation

The SLICE6 AIR DAS supports multiple methods of initiating Start Record and Event signals. Typically, Start Record and Event are initiated via an external hardware interface that provides a discrete contact closure (CC) signal to initiate recording (Recorder mode) or mark T=0 (Circular Buffer mode).

All SLICE6 AIR DAS data collection modes support multi-event arming. A unit armed in a multiple-event mode will re-arm when an event completes. The unit will stop re-arming when the number of events specified by the user has been recorded.

The SLICE6 AIR DAS can be placed in an auto-arm mode that will cause the unit to arm automatically when the power is cycled. This available with any available data collection mode.

Additionally, Circular Buffer mode supports level triggering. This method continuously samples the incoming data and begins data collection if the data is above or below predefined levels. For example, it might be useful to begin data collection when a certain accelerometer experiences a force above 200 g. Using level trigger and Circular Buffer mode, SLICE6 AIR DAS can support this or any level-trigger signal on any channel.

CAUTION:

Level trigger is NOT recommended when SLICE6 AIR DAS is used for destructive testing.

Finally, if the SLICE6 AIR DAS remains connected to the PC during data collection, the control software can be used to initiate data collection.

The table below summarizes the data collection modes and event/triggering options.

	Supports T=0 Start Record	T=0 methods supported	Data record window
Circular Buffer	Yes	Hardware (CC), software (PC) or level trigger	User-defined pre- and post- T=0 durations
Recorder	Yes	Hardware (CC), software (PC) or level trigger	User-defined duration after T=0
Hybrid Recorder	Yes	Hardware (CC), software (PC) or level trigger	User-defined post-Event duration
Continuous Recorder	Yes	Hardware (CC), software (PC), or level trigger	User-defined duration after T=0, with recording multiple events possible

Data Streaming

Real-time data streaming up to 20,000 sps per channel is supported via DataPRO software. An optional digital signal processing filter is available when streaming. Available filters include:

- CH10 6th IIR Butterworth
- CH10 6th FIR Dual-Step 45T → 65T Flat Response
- Real-Time 6th IIR Butterworth
- Real-Time 6th FIR Dual-Step 45T → 65T Flat Response

UDP streaming is also available. Please see the software manual for additional information, including how to create a test set-up. General information on software set-up for data streaming with NetView and FLIDAS can be found on the Help Center here.

Additional information on communication, synchronization, and supported formats begins on page 9.

IRIG

General information on record-in-place and data streaming using the IRIG time code standardization protocol can be found on the Help Center here. Please see the software manual for additional information, including how to create a test set-up.

RoHS
Manufacture/fabricate to meet the EU RoHS Directive 2011/65/EU and RoHS Annex II phthalates

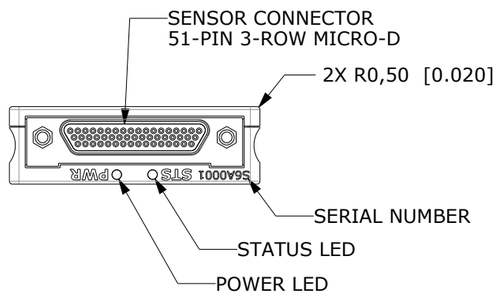
REV	ZONE	DESCRIPTION	DATE	BY
0		INITIAL RELEASE	2019-02-01	GN
1		PIN DESCRIPTIONS W/ 'GND/SHIELD' UPDATED TO 'GND'	2024-09-25	GD
		& UPDATED PIN 23 DESCRIPTION, WAS 'GROUND'		

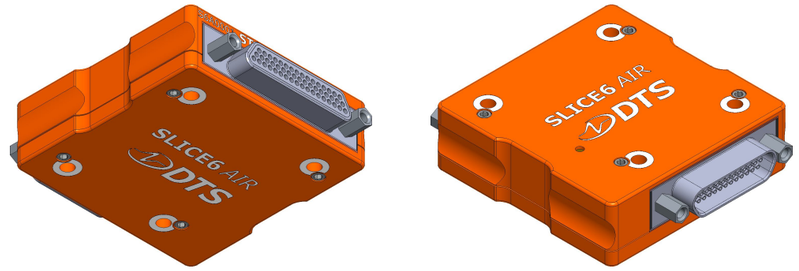
SENSOR CONNECTOR PIN ASSIGNMENTS

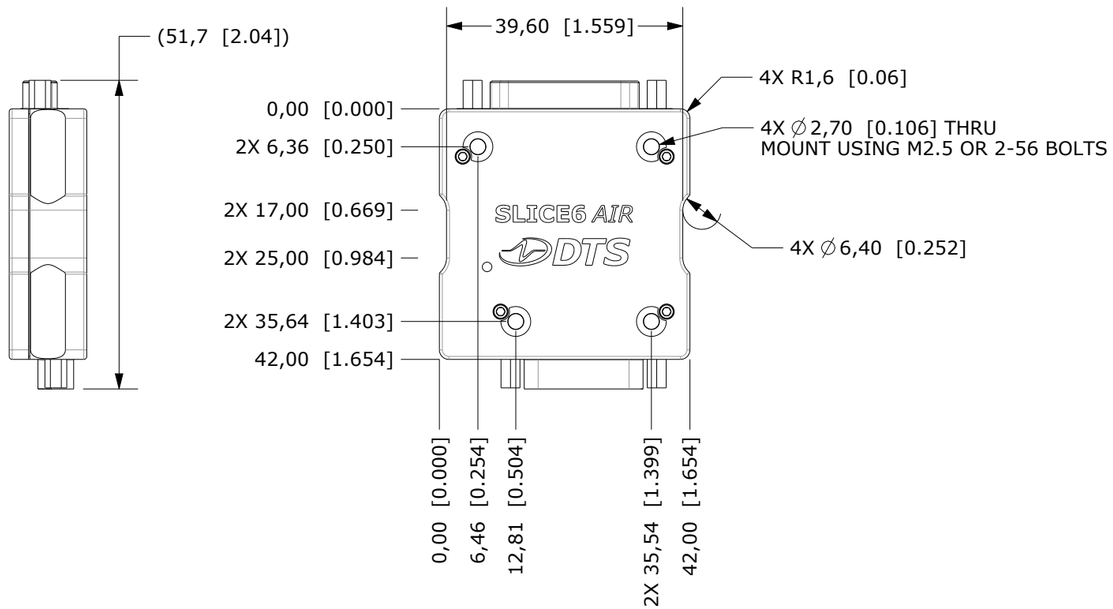
PIN	SIGNAL
1	-SIG_CH1
2	+SIG_CH1
3	GND
4	-SIG_CH2
5	+SIG_CH2
6	GND
7	-SIG_CH3
8	+SIG_CH3
9	-ID/-IEPE_CH3
10	-ID/-IEPE_CH4
11	+SIG_CH4
12	-SIG_CH4
13	GND
14	+SIG_CH5
15	-SIG_CH5
16	GND
17	+SIG_CH6
18	-SIG_CH6
19	-EX_CH1
20	+IEPE_CH1
21	GND
22	-EX_CH2
23	+IEPE_CH2
24	GND
25	-EX_CH3
26	+IEPE_CH3
27	GND
28	+IEPE_CH4
29	-EX_CH4
30	GND
31	+IEPE_CH5
32	-EX_CH5
33	GND
34	+IEPE_CH6
35	-EX_CH6
36	+EX_CH1
37	+ID_CH1
38	-ID/-IEPE_CH1
39	+EX_CH2
40	+ID_CH2
41	-ID/-IEPE_CH2
42	+EX_CH3
43	+ID_CH3
44	+ID_CH4
45	+EX_CH4
46	-ID/-IEPE_CH5
47	+ID_CH5
48	+EX_CH5
49	-ID/-IEPE_CH6
50	+ID_CH6
51	+EX_CH6

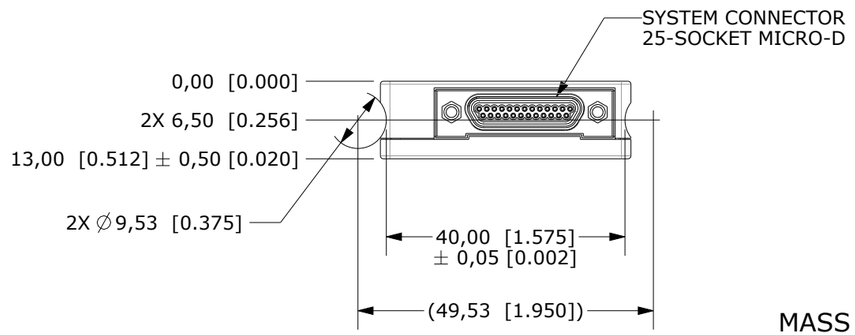
SYSTEM CONNECTOR PIN ASSIGNMENTS

PIN	SIGNAL
1	+PWR
2	+PWR
3	+PWR
4	GND
5	GND
6	TX_2_P
7	TX_2_N
8	RX_2_P
9	RX_2_N
10	TX_1_P
11	TX_1_N
12	RX_1_P
13	RX_1_N
14	#ON
15	#START
16	#EVENT
17	STATUS
18	UART_RX_P
19	UART_RX_N
20	UART_TX_P
21	UART_TX_N
22	GND
23	CHASSIS
24	IRIGB
25	PPS









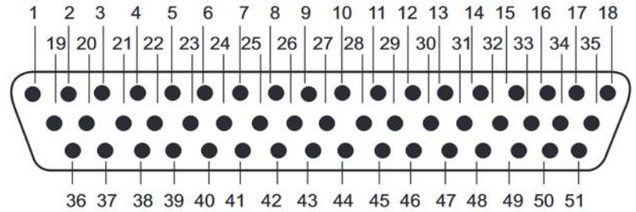
--- CONNECTOR MATE RECOMMENDATIONS ---

51-Socket Sensor Connector:
Omnetics MMDS-513-N-02-SS (Solder Cup)
Omnetics MMDS-513-N-02-WD** (Discrete Wire)

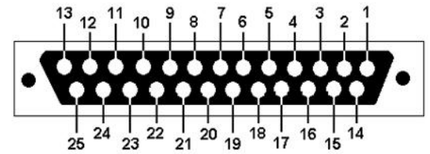
25-Pin System Connector:
Omnetics MMDP-025-N-02-SS (Solder Cup)
Omnetics MMDP-025-N-02-WD** (Discrete Wire)

** See ordering options on manufacturer website for wire gage, type, color, and length options

LOOKING INTO FRONT OF SLICE6 AIR
SENSOR CONNECTOR



LOOKING INTO FRONT OF SLICE6 AIR
SYSTEM CONNECTOR



MASS = 50 ± 5 GRAMS

DTS
SEAL BEACH, CA 90740
562-493-0158
www.dtsweb.com

MATERIAL: 6061-T6 ALUMINUM W/ INTERNATIONAL ORANGE ANODIZE

UNLESS OTHERWISE SPECIFIED:
UNITS = MM [INCH]
DIMENSIONAL TOLERANCES ±.254 [0.010"]
INTERPRET PER ASME Y14.5. DO NOT SCALE.

DESCRIPTION: SLICE6 AIR, MOUNTING DRAWING

DTS P/N:

REV: 1

DRAWN: G NEWTON

DATE: 2019-02-01 | SIZE: B | SCALE: 1:1 | SHEET: 1 OF 1

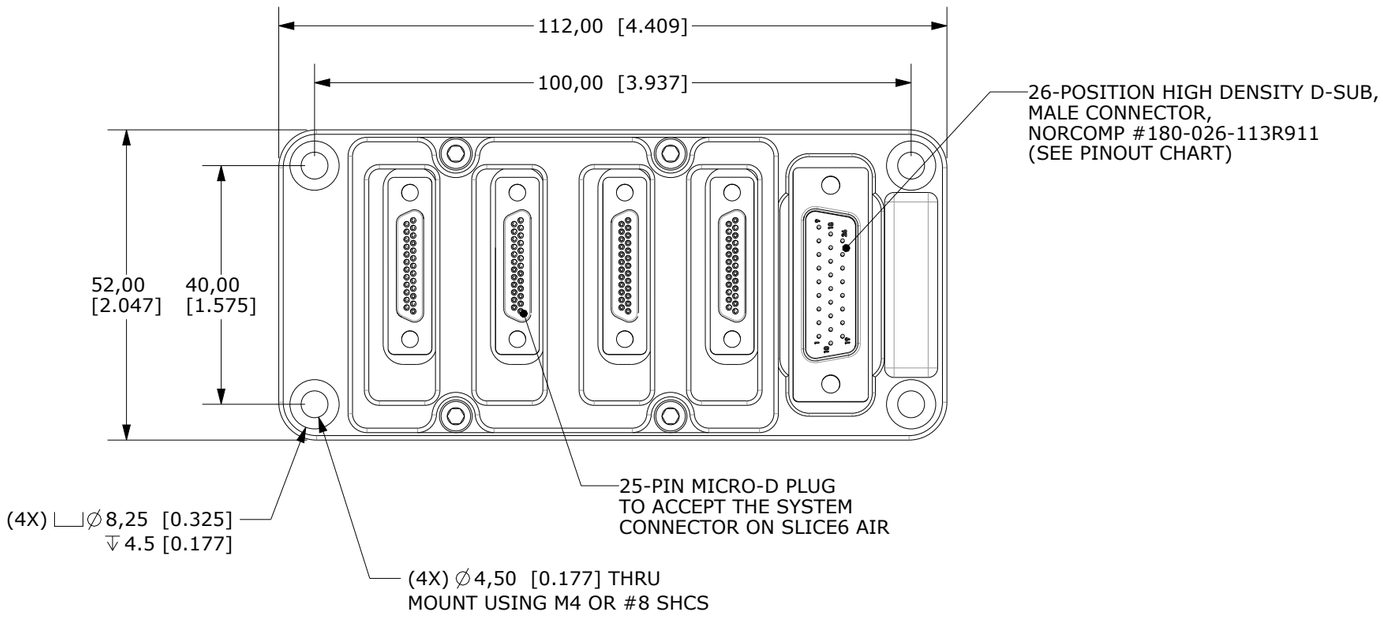
MDL: DTS_SLICE6_AIR

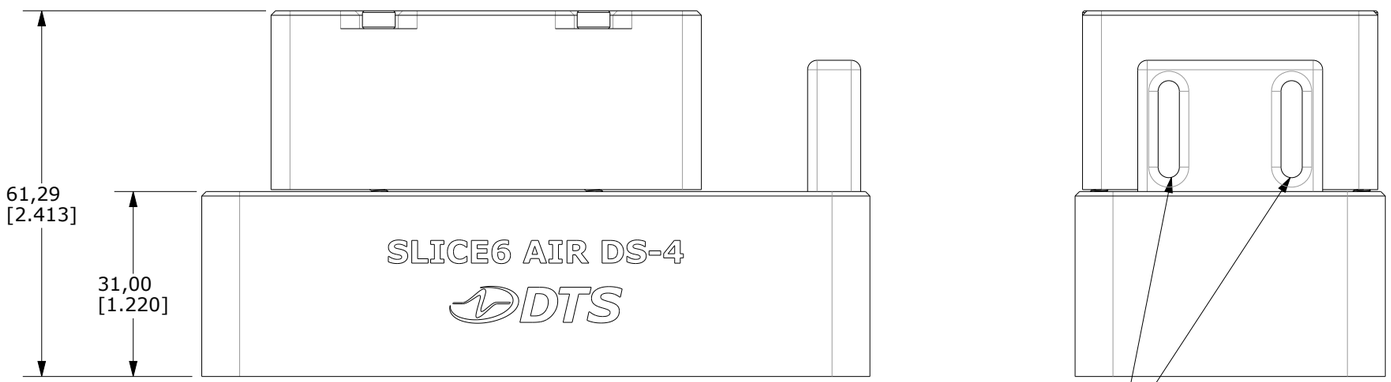
RoHS
Manufacture/fabricate to meet the EU RoHS Directive 2011/65/EU and RoHS Annex II phthalates

REV	ZONE	DESCRIPTION	DATE	BY
0		ORIGINAL RELEASE	2020-08-04	JC
1		ADDED INPUT CONNECTOR PINOUT AND ADDITIONAL INFO	2020-10-27	JC
2		CORRECTED TORQUE SPEC ON PG.2	2021-04-13	JC
3		CORRECTED MATERIAL CALLOUT IN TITLE BLOCK	2024-03-06	JC

26-POSITION HD D-SUB INPUT CONNECTOR

PIN	SIGNAL
1	VDC INPUT
2	TX1P
3	TX1N
4	RX1P
5	RX1N
6	TX2P
7	TX2N
8	RX2P
9	RX2N
10	VDC INPUT
11	VDC INPUT
12	GND
13	PPS
14	START
15	UART_TX_P
16	UART_TX_N
17	UART_RX_P
18	UART_RX_N
19	GND
20	GND
21	GND
22	ON
23	STATUS
24	EVENT
25	IRIG
26	CASE

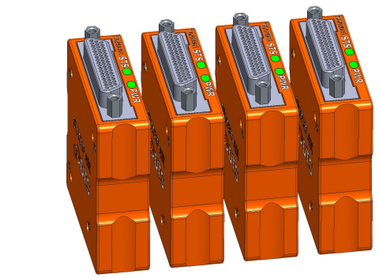


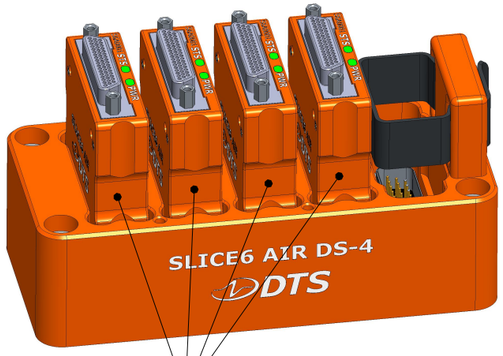


MASS = 400 ±40 GRAMS

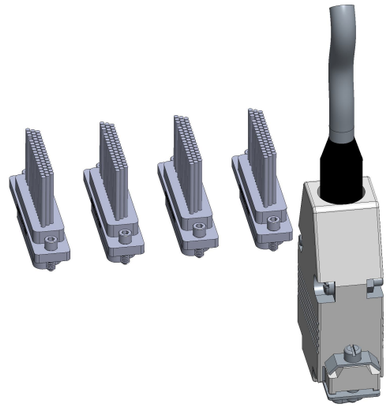
DTS SEAL BEACH, CA 90740 562-493-0158 www.dtsweb.com	DESCRIPTION: SLICE6 AIR 4-MODULE RACK (DS-4), PASSIVE MOUNTING DRAWING		
MATERIAL: BASE: 6061-T6 ALUMINUM W/ ORANGE ANODIZE COVER: DELRIN, BLACK (ACETAL)	DTS P/N: 13006-90490		REV: 3
UNLESS OTHERWISE SPECIFIED: UNITS = MM [INCH] DIMENSIONAL TOLERANCES ±.254 [0.010"] INTERPRET PER ASME Y14.5. DO NOT SCALE.	DRAWN: J CASEY		
	DATE: 2020-08-04	SIZE: B / SCALE: 1:1	SHEET: 1 OF 2

MDL: DTS_SLICE6_AIR_DS-4_NO_DAS





INSERT SLICE6 AIR DAS
TO ENGAGE WITH DOCKING
STATION CONNECTORS



EVENLY TIGHTEN THESE M3 SHCS TO A
MINIMUM TORQUE OF 0.75 Nm [6.6 IN-LB]

VELCRO STRAP FOR
STRAIN RELIEF OF THE
CABLE CONNECTOR

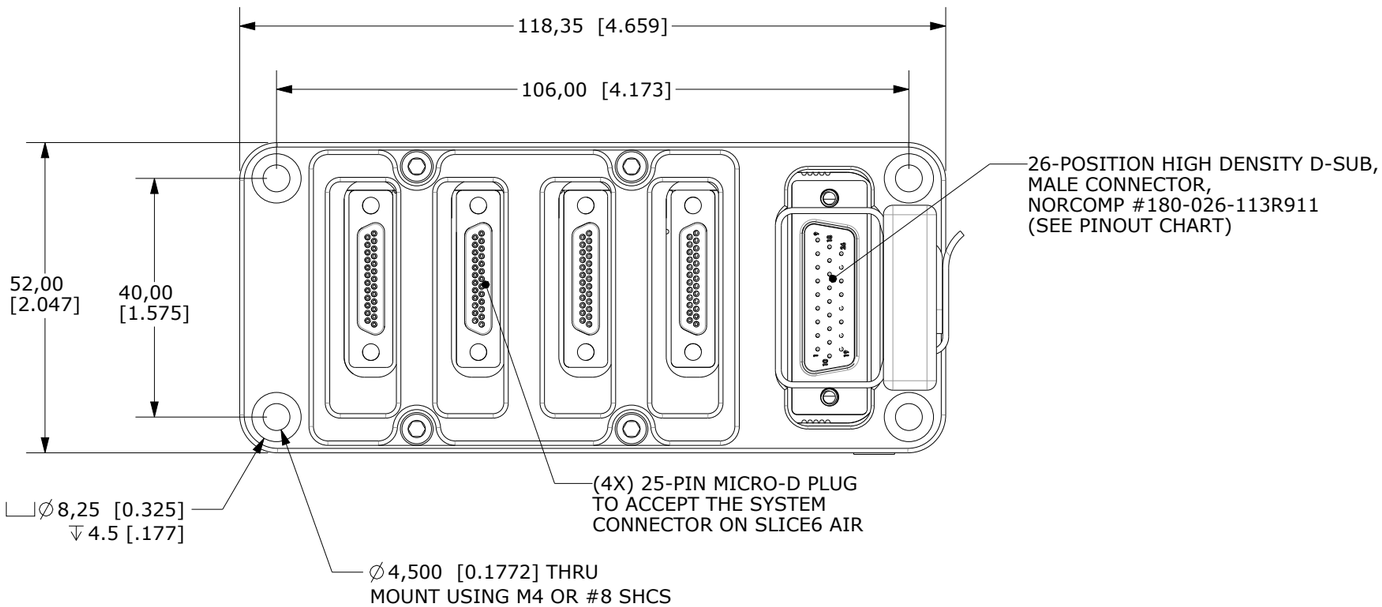
DESCRIPTION: SLICE6 AIR 4-MODULE RACK (DS-4), PASSIVE MOUNTING DRAWING			
DTS P/N: 13006-90490			REV: 3
DRAWN: J CASEY			
DATE: 2020-08-04	SIZE: B	SCALE: 1:1	SHEET: 2 OF 2

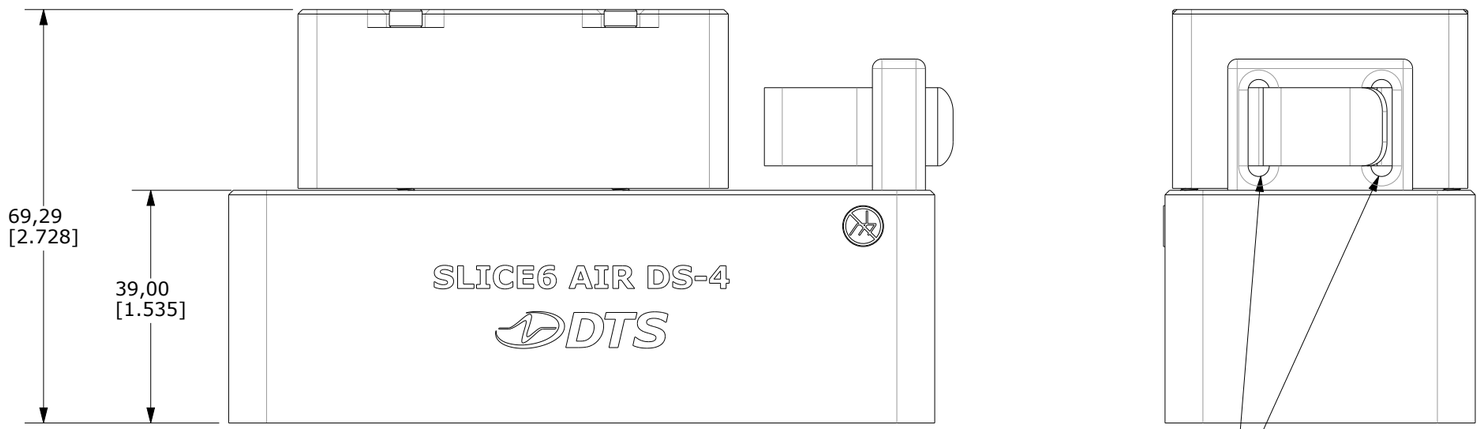
RoHS
Manufacture/fabricate to meet the EU RoHS Directive 2011/65/EU and RoHS Annex II phthalates

REV	ZONE	DESCRIPTION	DATE	BY
0		ORIGINAL RELEASE	2021-08-04	JC
1		CORRECTED MATERIAL CALLOUT IN TITLE BLOCK	2024-03-06	JC

26-POSITION HD D-SUB INPUT CONNECTOR

PIN	SIGNAL
1	VDC INPUT
2	TX1P
3	TX1N
4	RX1P
5	RX1N
6	TX2P
7	TX2N
8	RX2P
9	RX2N
10	VDC INPUT
11	VDC INPUT
12	GND
13	PPS
14	START
15	UART_TX_P
16	UART_TX_N
17	UART_RX_P
18	UART_RX_N
19	GND
20	GND
21	GND
22	ON
23	STATUS
24	EVENT
25	IRIG
26	CASE





MASS = 435 ±40 GRAMS

DTS SEAL BEACH, CA 90740
562-493-0158
www.dtsweb.com

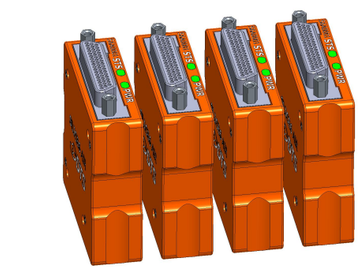
MATERIAL:
BASE: 6061-T6 ALUMINUM W/ ORANGE ANODIZE
COVER: DELRIN, BLACK (ACETAL)

UNLESS OTHERWISE SPECIFIED:
UNITS = MM [INCH]
DIMENSIONAL TOLERANCES ±.254 [0.010"]
INTERPRET PER ASME Y14.5. DO NOT SCALE.

DESCRIPTION:
SLICE6 AIR 4-MODULE RACK (DS-4), EMI PROTECTED, MOUNTING DRAWING

DTS P/N: 13006-90800
REV: 1
DRAWN: J CASEY
DATE: 2021-08-04
SIZE: B
SCALE: 1:1
SHEET: 1 OF 2

MDL: DTS_SLICE6_AIR_DS-4_NO_DAS



INSERT SLICE6 AIR DAS
TO ENGAGE WITH DOCKING
STATION CONNECTORS

EVENLY TIGHTEN THESE M3 SHCS TO A
MINIMUM TORQUE OF 0.75 Nm [6.6 IN-LB]

VELCRO STRAP FOR
STRAIN RELIEF OF THE
CABLE CONNECTOR

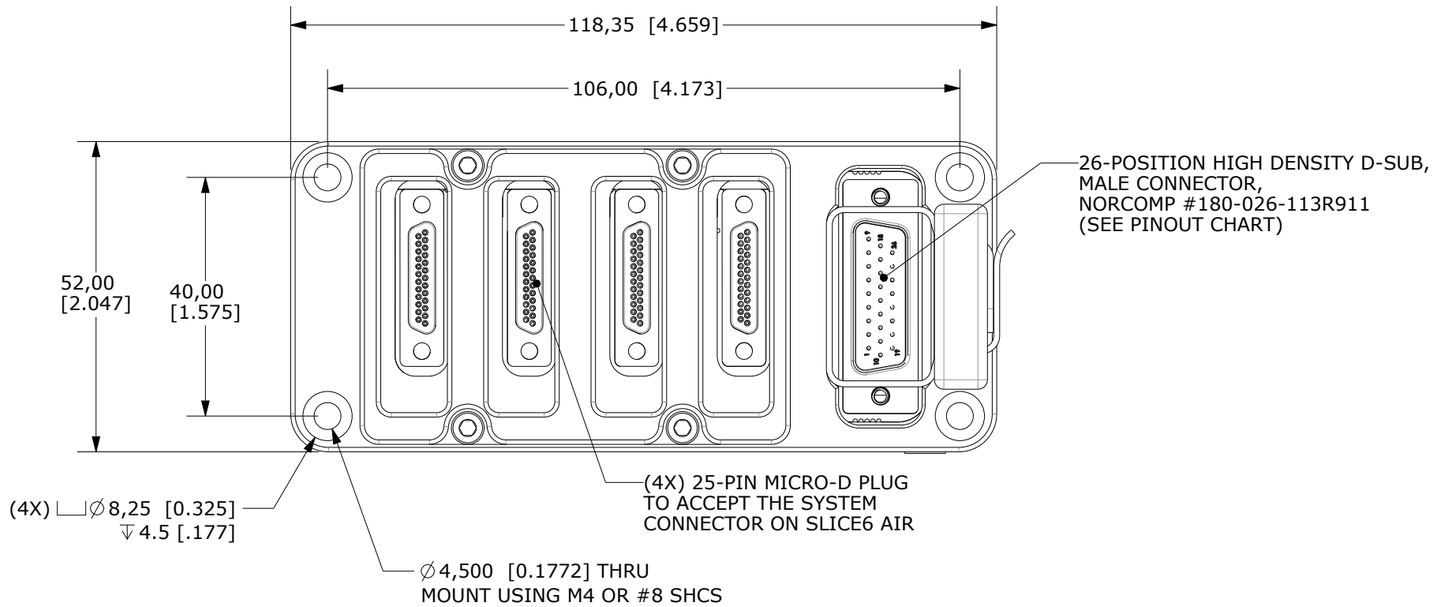
DESCRIPTION: SLICE6 AIR 4-MODULE RACK (DS-4), EMI PROTECTED, MOUNTING DRAWING			
DTS P/N: 13006-90800			REV: 1
DRAWN: J CASEY			
DATE: 2021-08-04	SIZE: B	SCALE: 2:3	SHEET: 2 OF 2

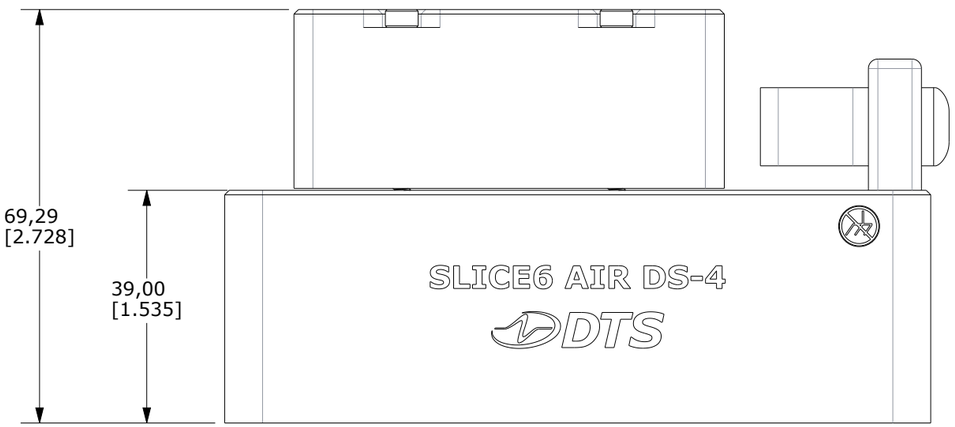
RoHS
Manufacture/fabricate to meet the EU RoHS Directive 2011/65/EU and RoHS Annex II phthalates

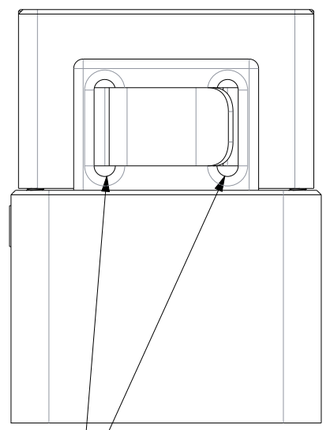
REV	ZONE	DESCRIPTION	DATE	BY
0		ORIGINAL RELEASE	2023-12-13	JC

26-POSITION HD D-SUB INPUT CONNECTOR

PIN	SIGNAL
1	VDC INPUT
2	TX1P
3	TX1N
4	RX1P
5	RX1N
6	TX2P
7	TX2N
8	RX2P
9	RX2N
10	VDC INPUT
11	VDC INPUT
12	GND
13	PPS
14	START
15	UART_TX_P
16	UART_TX_N
17	UART_RX_P
18	UART_RX_N
19	GND
20	GND
21	GND
22	ON
23	STATUS
24	EVENT
25	IRIG
26	CASE







THESE SLOTS ARE FOR A VELCRO STRAP TO PROVIDE STRAIN RELIEF OF THE CABLE CONNECTOR

MASS = 435 ± 40 GRAMS

DTS SEAL BEACH, CA 90740
562-493-0158
www.dtsweb.com

MATERIAL:
BASE: 6061-T6 ALUMINUM W/ ORANGE ANODIZE
COVER: DELRIN, BLACK (ACETAL)

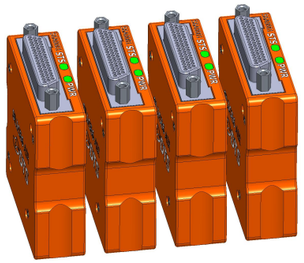
UNLESS OTHERWISE SPECIFIED:
UNITS = MM [INCH]
DIMENSIONAL TOLERANCES ±.254 [0.010"]
INTERPRET PER ASME Y14.5. DO NOT SCALE.

DESCRIPTION:
SLICE6 AIR 4-MODULE RACK (DS-4), CHASSIS ISOLATED & EMI PROTECTED, MOUNTING DRAWING

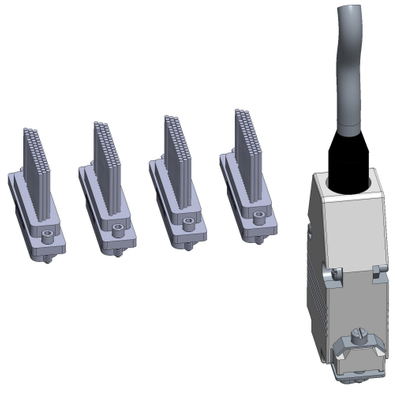
DTS P/N:	REV:
13006-90801	0

DRAWN:	DATE:	SIZE:	SCALE:	SHEET:
J CASEY	2023-12-13	B	1:1	1 OF 2

MDL: DTS_SLICE6_AIR_DS-4_NO_DAS



INSERT SLICE6 AIR DAS
TO ENGAGE WITH DOCKING
STATION CONNECTORS

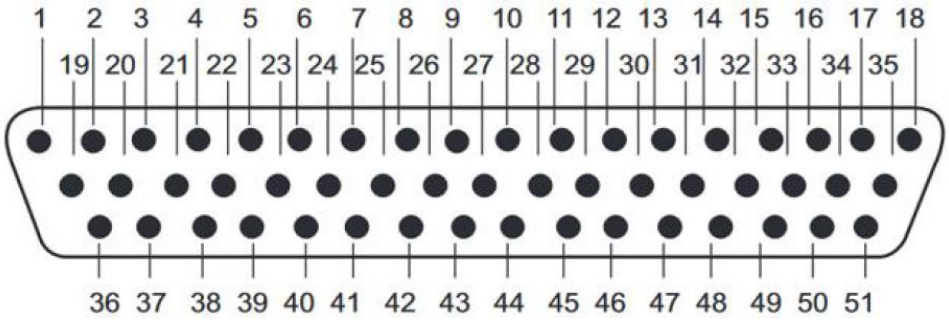


EVENLY TIGHTEN THESE M3 SHCS TO A
MINIMUM TORQUE OF 0.75 Nm [6.6 IN-LB]

VELCRO STRAP FOR
STRAIN RELIEF OF THE
CABLE CONNECTOR

DESCRIPTION: SLICE6 AIR 4-MODULE RACK (DS-4), CHASSIS ISOLATED & EMI PROTECTED, MOUNTING DRAWING			
DTS P/N: 13006-90801			REV: 0
DRAWN: J CASEY			
DATE: 2023-12-13	SIZE: B	SCALE: 2:3	SHEET: 2 OF 2

Sensor Connector



(looking into the connector)

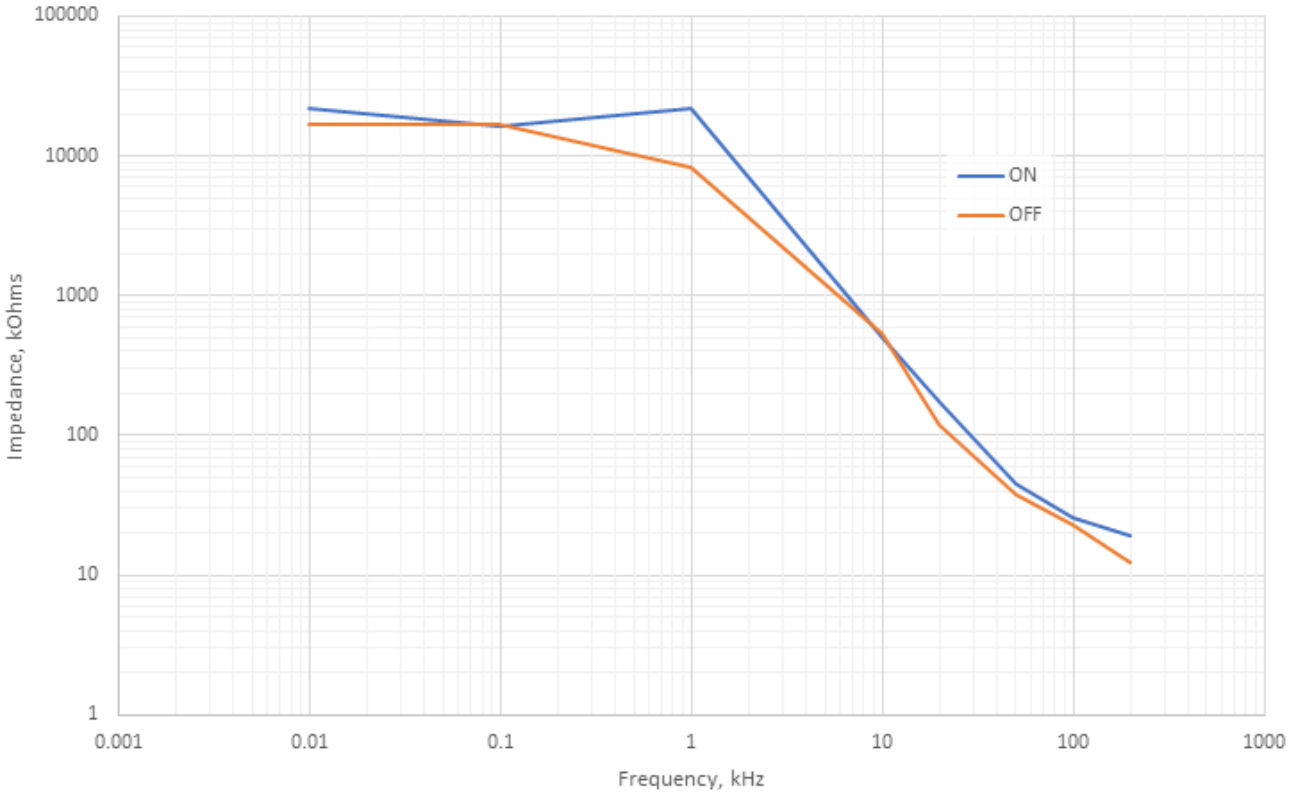
Suggested cable connector P/N:
Omnetics A99014-513 (MMDS-513-N-02-SS) (solder cup termination) (DTS P/N 80000-04110-R)
Omnetics MMDS-513-N-02-WD* (discrete wires)

Pin	Signal	Voltage	Current
1	-SIG_CH1	-0.3 ~ 5.3 V	<1 mA
2	+SIG_CH1	-0.3 ~ 5.3 V	<1 mA
3	GROUND	0 V	<1 mA
4	-SIG_CH2	-0.3 ~ 5.3 V	<1 mA
5	+SIG_CH2	-0.3 ~ 5.3 V	<1 mA
6	GROUND	0 V	<1 mA
7	-SIG_CH3	-0.3 ~ 5.3 V	<1 mA
8	+SIG_CH3	-0.3 ~ 5.3 V	<1 mA
9	-ID/-IEPE_CH3	0 V	<10 mA
10	-ID/-IEPE_CH4	0 V	<10 mA
11	+SIG_CH4	-0.3 ~ 5.3 V	<1 mA
12	-SIG_CH4	-0.3 ~ 5.3 V	<1 mA
13	GROUND	0 V	<1 mA
14	+SIG_CH5	-0.3 ~ 5.3 V	<1 mA
15	-SIG_CH5	-0.3 ~ 5.3 V	<1 mA
16	GROUND	0 V	<1 mA
17	+SIG_CH6	-0.3 ~ 5.3 V	<1 mA
18	-SIG_CH6	-0.3 ~ 5.3 V	<1 mA
19	-EX_CH1	0 V	<40 mA
20	+IEPE_CH1	-5V ~ +25 V	<10 mA
21	GROUND	0 V	<1 mA
22	-EX_CH2	0 V	<40 mA
23	+IEPE_CH2	-5V ~ +25 V	<10 mA
24	GROUND	0 V	<1 mA
25	-EX_CH3	0 V	<40 mA
26	+IEPE_CH3	-5V ~ +25 V	<10 mA

Pin	Signal	Voltage	Current
27	GROUND	0 V	<1 mA
28	+IEPE_CH4	-5V ~ +25 V	<10 mA
29	-EX_CH4	0 V	<40 mA
30	GROUND	0 V	<1 mA
31	+IEPE_CH5	-5V ~ +25 V	<10 mA
32	-EX_CH5	0 V	<40 mA
33	GROUND	0 V	<10 mA
34	+IEPE_CH6	-5V ~ +25 V	<10 mA
35	-EX_CH6	0 V	<40 mA
36	+EX_CH1	5 V	<40 mA
37	+ID_CH1	3.3 V	<1 mA
38	-ID/-IEPE_CH1	0 V	<10 mA
39	+EX_CH2	5 V	<40 mA
40	+ID_CH2	3.3 V	<1 mA
41	-ID/-IEPE_CH2	0 V	<10 mA
42	+EX_CH3	5 V	<40 mA
43	+ID_CH3	3.3 V	<1 mA
44	+ID_CH4	3.3 V	<1 mA
45	+EX_CH4	5 V	<40 mA
46	-ID/-IEPE_CH5	0 V	<10 mA
47	+ID_CH5	3.3 V	<1 mA
48	+EX_CH5	5 V	<40 mA
49	-ID/-IEPE_CH6	0 V	<10 mA
50	+ID_CH6	3.3 V	<1 mA
51	+EX_CH6	5 V	<40 mA

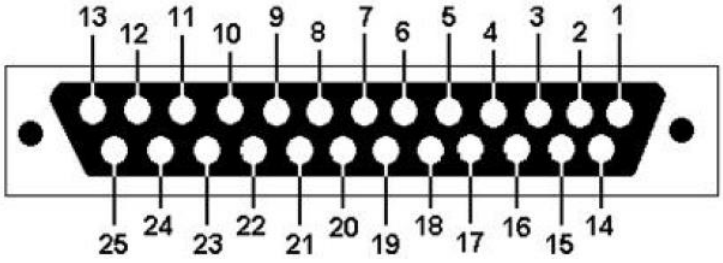
* See ordering options on manufacturer web site for additional information.

SLICE6 AIR Input Impedance



Note: This only applies to inputs less than 1 PN junction away from ground.
If the voltage increases beyond that, the hardware will clip the signal.

System Connector



(looking into the connector)

Suggested cable connector P/N:
Omnetics A98001-025 (MMDP-025-N-02-SS) (solder cup termination) (DTS P/N 80000-04111-R)
Omnetics MMDP-025-N-02-WD* (discrete wires)

Pin	Function	Voltage	Current
1	+PWR	9 ~ 30 V	<150 mA
2	+PWR	9 ~ 30 V	<150 mA
3	+PWR	9 ~ 30 V	<150 mA
4	GND	0 V	<150 mA
5	GND	0 V	<150 mA
6	TX_2_P	±2.5 V	<1 mA
7	TX_2_N	±2.5 V	<1 mA
8	RX_2_P	±2.5 V	<1 mA
9	RX_2_N	±2.5 V	<1 mA
10	TX_1_P	±2.5 V	<1 mA
11	TX_1_N	±2.5 V	<1 mA
12	RX_1_P	±2.5 V	<1 mA
13	RX_1_N	±2.5 V	<1 mA
14	#ON	0 ~ 30 V	<1 mA
15	#START	0 ~ 5 V	<15 mA
16	#EVENT	0 ~ 5 V	<15 mA
17	STATUS	0 ~ 5 V	<2 mA
18	UART_RX_P	-25 ~ +25 V	<1 mA
19	UART_RX_N	-25 ~ +25 V	<1 mA
20	UART_TX_P	-25 ~ +25 V	<1 mA
21	UART_TX_N	-25 ~ +25 V	<1 mA
22	GND	0 V	<150 mA
23	CHASSIS	0 V	<1 mA
24	IRIGB**	3 ~ 13 V	<1 mA
25	PPS	0 ~ 5 V	<1 mA

* See ordering options on manufacturer web site for additional information.
** Minimum V_{PP} on the large cycles is 3 V. Maximum V_{PP} is 13 V.
The DAS and DS-4 have the same IRIG-B specifications.

UART RS232/RS422 Connections

SLICE6 AIR DAS/ DS-4	Connect to RS232
UART_TX_N	UART_RX_N (DB9 pin 2)
GROUND	GROUND (DB9 pin 5)

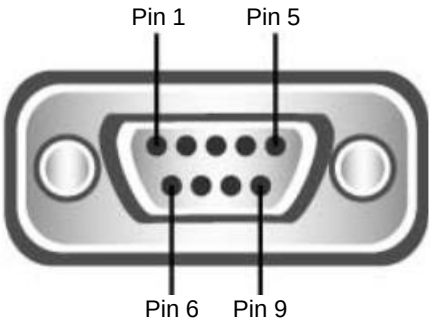
SLICE6 AIR DAS/ DS-4	Connect to RS422
UART_TX_P	UART_RX_P
UART_TX_N	UART_RX_N
GROUND	GROUND

Notes: RX is a dedicated input and TX is a dedicated output.
RS232 signals are single-ended and should be connected only to the RX_N pin.
RS422 signals are differential and must be connected to both UART_RX_P and UART_RX_N pins.
DS-4 is receive only. Installed DAS modules must be slave devices.

RS232 Pin Assignments

Pin	Function
1	DCD
2	RXD
3	TXD
4	DTR
5	GROUND
6	DSR
7	RTS
8	CTS
9	RI

DB9M



(looking into the connector)

Ethernet Chaining

To share Ethernet communications, chain SLICE6 AIR DAS modules or DS-4 units together using the methodology in the table below. (Be sure to properly terminate an Ethernet chain.)

SLICE6 AIR DAS/DS-4 #1	SLICE6 AIR DAS/DS-4 #2	SLICE6 AIR DAS/DS-4 #3
Function	**Function**	**Function**
	TX_2_P	RX_1_P
	TX_2_N	RX_1_N
	RX_2_P	TX_1_P
	RX_2_N	TX_1_N
TX_2_P	RX_1_P	
TX_2_N	RX_1_N	
RX_2_P	TX_1_P	
RX_2_N	TX_1_N	

Accessories/Support Equipment

10400-00060: Power supply; 15 VDC, 4 A (90-240 VAC in, LEMO termination) (PS-05)
13000-30541: Power supply; 12 VDC, 2.5 A (90-240 VAC in, Molex term)
13000-31480: SLICE End-of-Chain Interface (15 cm; Molex term)
13000-31490: Cable, SLICE EOC Interface to S6A SYSTEM port (Molex>Micro-D 25P)[10]
13000-60501: SLICE6 AIR DAS/TSR AIR Test Device Cable Kit
13006-90450: SLICE6 AIR Bridge Plug
13006-90460: SLICE6 AIR Chain Module[11]
13006-9047x: Cable, SLICE6 AIR DAS extension (26-pin to 26-socket)[12]
13006-90480: SLICE6 AIR Interface Device
13006-90510: SLICE6 AIR Ethernet Return Plug[11]
13006-90520: SLICE6 AIR Interface Device and Cable Kit
13006-90560: SLICE6 AIR 6 Ch Sensor Conn Assy (Micro-D 51S conn, backshell, S/R)
13006-90570: SLICE6 AIR DAS System Conn Assy (Micro-D 25P conn, backshell, S/R)
13006-90630: Cable, SLICE6 AIR 2-rack daisy chain (SYS port > 2 racks in series) (120")
13006-90690: SLICE6 AIR DAS Sensor Connector Protector Kit
13006-90840: SLICE6 AIR DAS/TSR AIR Test Device
13006-90890: SLICE6 AIR DAS Rack Signal Pass-through Module
13006-90900: Cable, SLICE6 AIR DS-4 daisy-chain (DB26S to DB26S) (36")
13006-90920: SLICE6 AIR 4-module Rack (DS-4) Test Device
13006-90930: SLICE6 AIR 4-module Rack (DS-4) Test Device Cable Kit
89100-24920-R: SLICE6 AIR DS-4 module retainer
93000-S0013-R: Screw, SHC, 18-8; M3 x 35 mm L, 0.5 mm pitch (fastens 89100-24920-R to DS-4)
99000-00418-R: Nut driver, precision, 3/16" hex; 6-1/8"L

[10] Use with 13000-31480.
[11] To connect individual chain modules (P/N 13006-90460) to each other, the standoffs on the socket side must be removed. Retain the screws for future use. (They are required to use/secure a return plug P/N 13006-90510.)
[12] x = multiple lengths available

Appendix B: Hardware Configuration Specifications

SLICE6 AIR DAS are typically delivered with a default IP address as follows:

IP address	192.168.4.**xx** where **xx** is based on the last two digits of the S/N; for example: S/N S6A00**47** = 192.168.4.**47** S/N S6A02**33** = 192.168.4.**33**
Netmask	255.255.248.0

The calibration data for your equipment identifies the IP address as shipped from the factory. If the calibration data is not available, try using the default address described in the table above.

If you need information on the specifics of your equipment, please submit a request through the DTS Help Center web portal (support.dtsweb.com) and include the serial number(s) of the equipment and parameters you are asking about.

Using the SLICE Network Configuration Utility

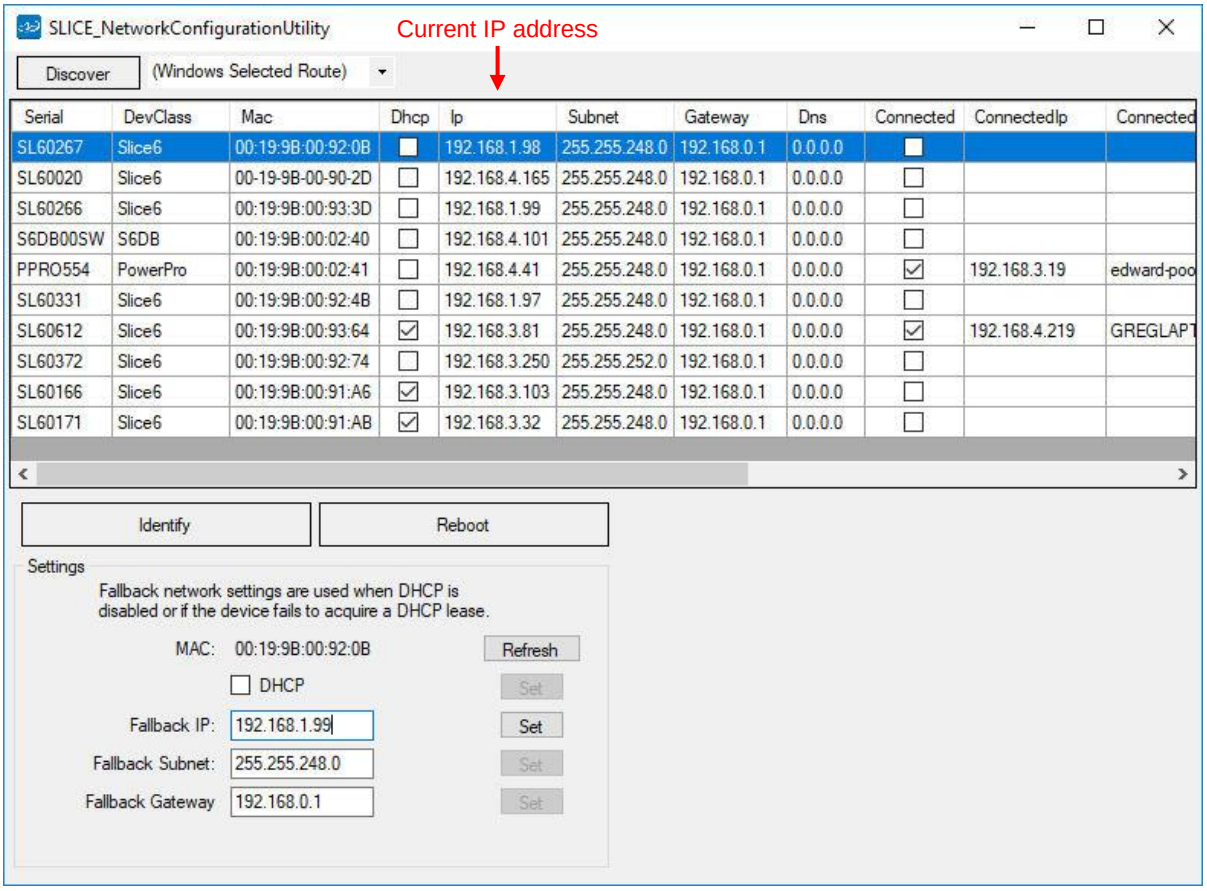
The *SLICE Network Configuration Utility* (available from the DTS Help Center) can be used to view or change the unit's IP address.

Use of the utility requires a network that supports multicast and the workstation running the utility must also allow it. Confirm that:

- The PC's Ethernet properties are not using anything that can block multicast; e.g., *DNE LightWeight Filter*.
- The Windows Firewall will allow multicast traffic.
- Any third-party anti-virus software will allow multicast traffic.

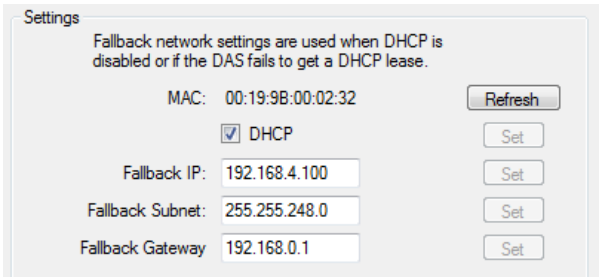
1. Open the *SLICE Network Configuration Utility*.

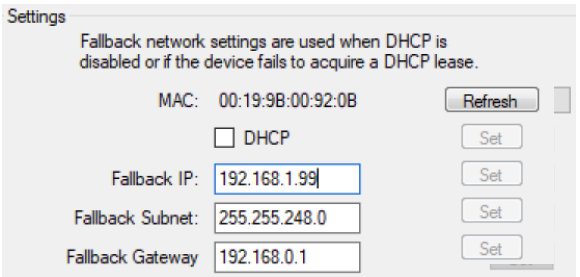
2. The software will immediately look for all attached devices and list them in the table. (You may also click Discover to refresh the list.)



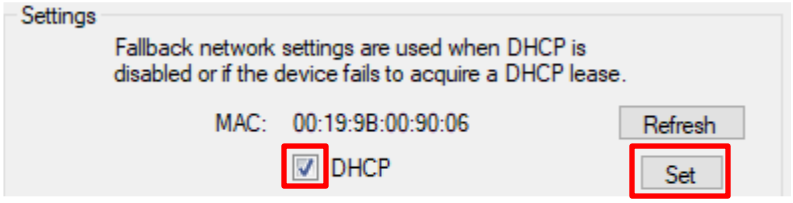
Note: Clicking on Identify for any selected device will cause the unit's LED to flash.

3. Select the SLICE6 device from the list. (A SLICE6 DAS is selected in the image above.) The device Settings are shown at the bottom of the window. The current IP address may or may not match the fallback IP address, depending on whether DHCP is selected.

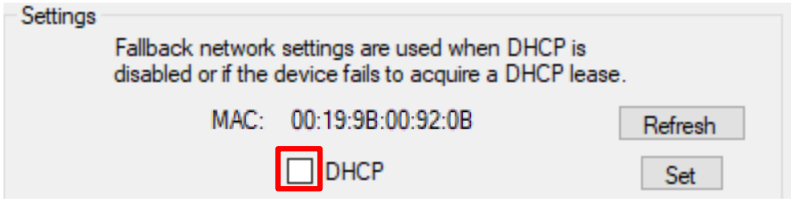




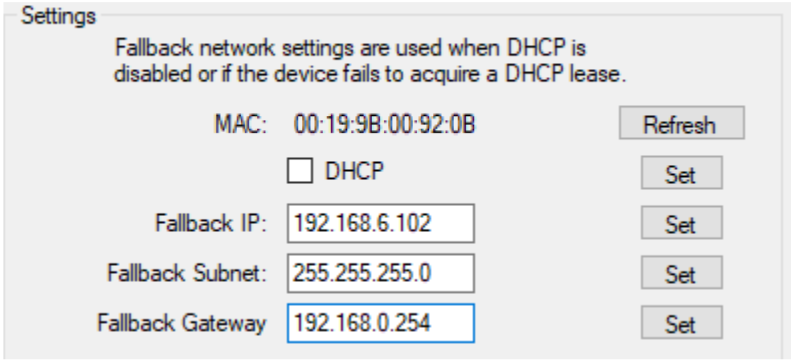
4. To enable DHCP, select the check box then select Set . Proceed to step 7.



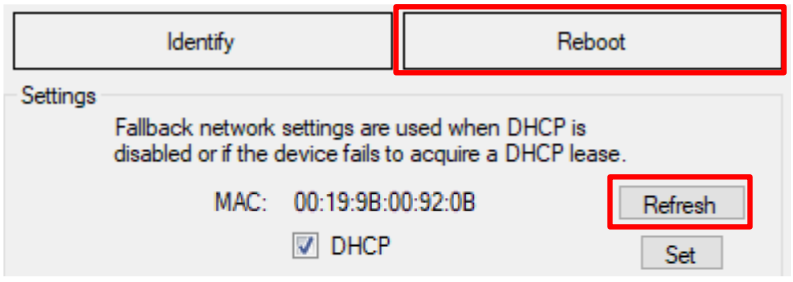
5. To disable DHCP and manually enter IP address and other information, unselect the check box.



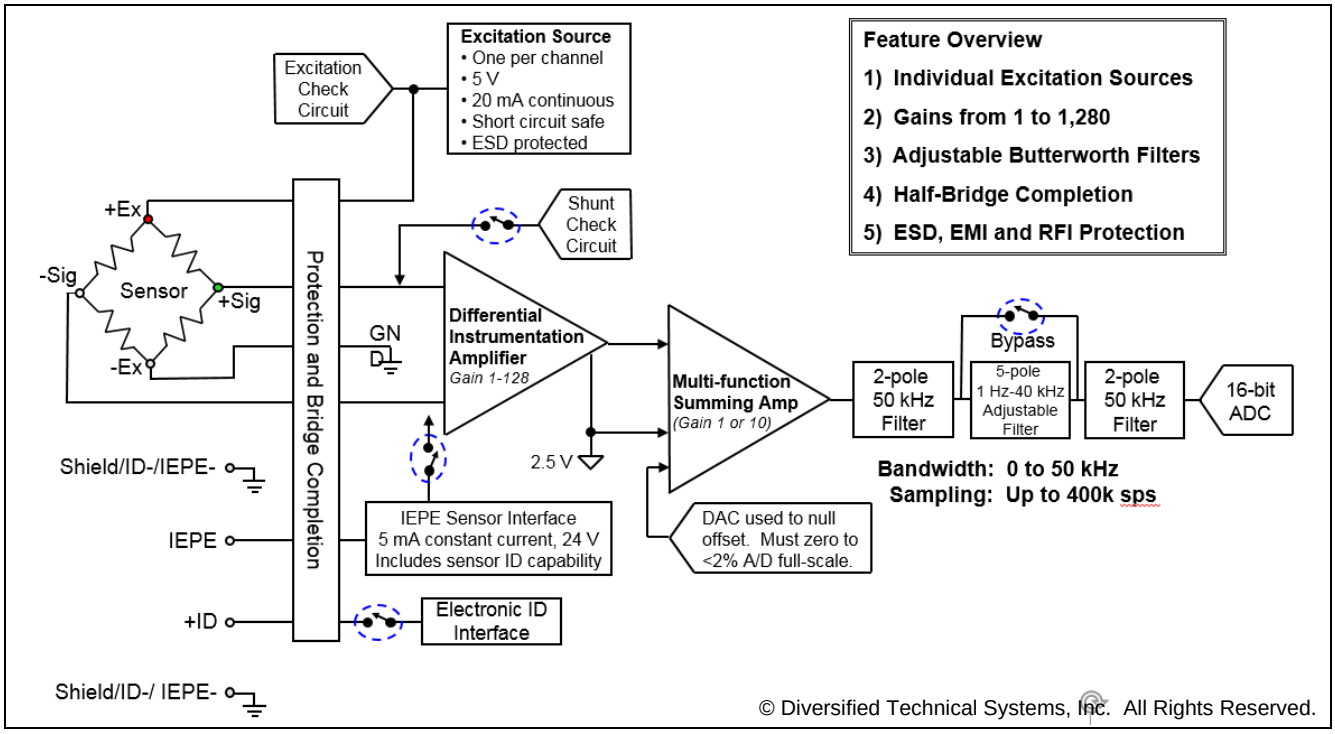
6. Enter the new parameters and select Set for each item updated. (Note: The MAC address is not user configurable.)



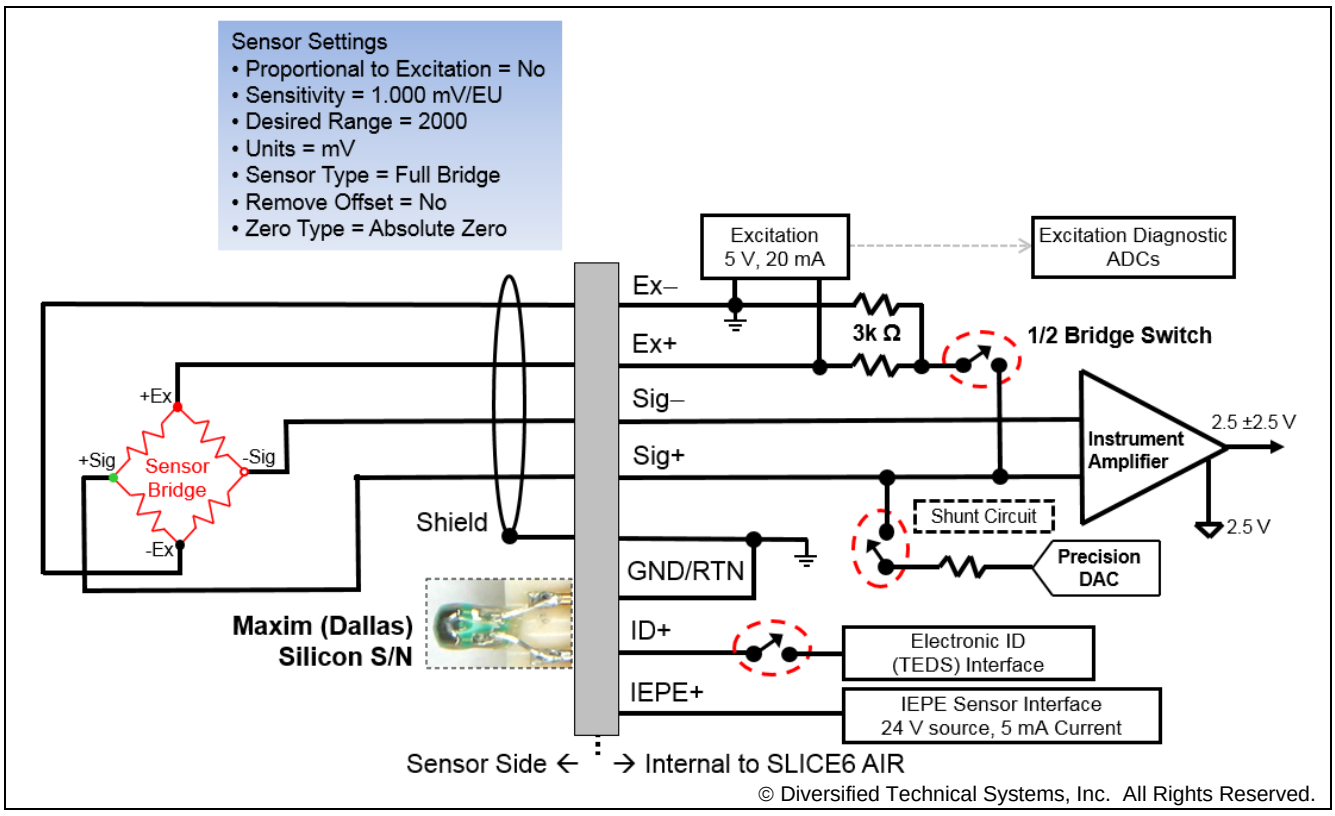
7. Select Refresh to view the settings (optional), then Reboot the device.



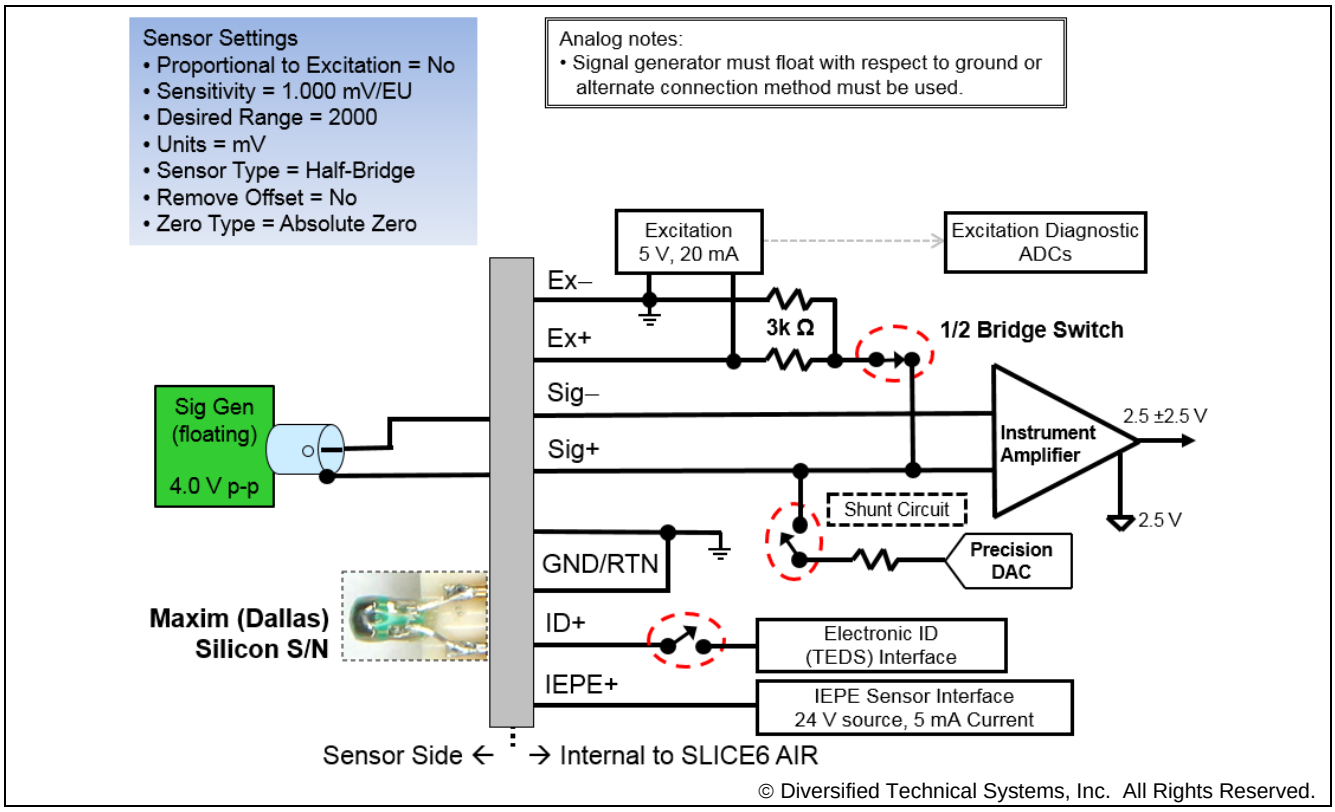
Appendix C: Sensor Interface Wiring Diagrams



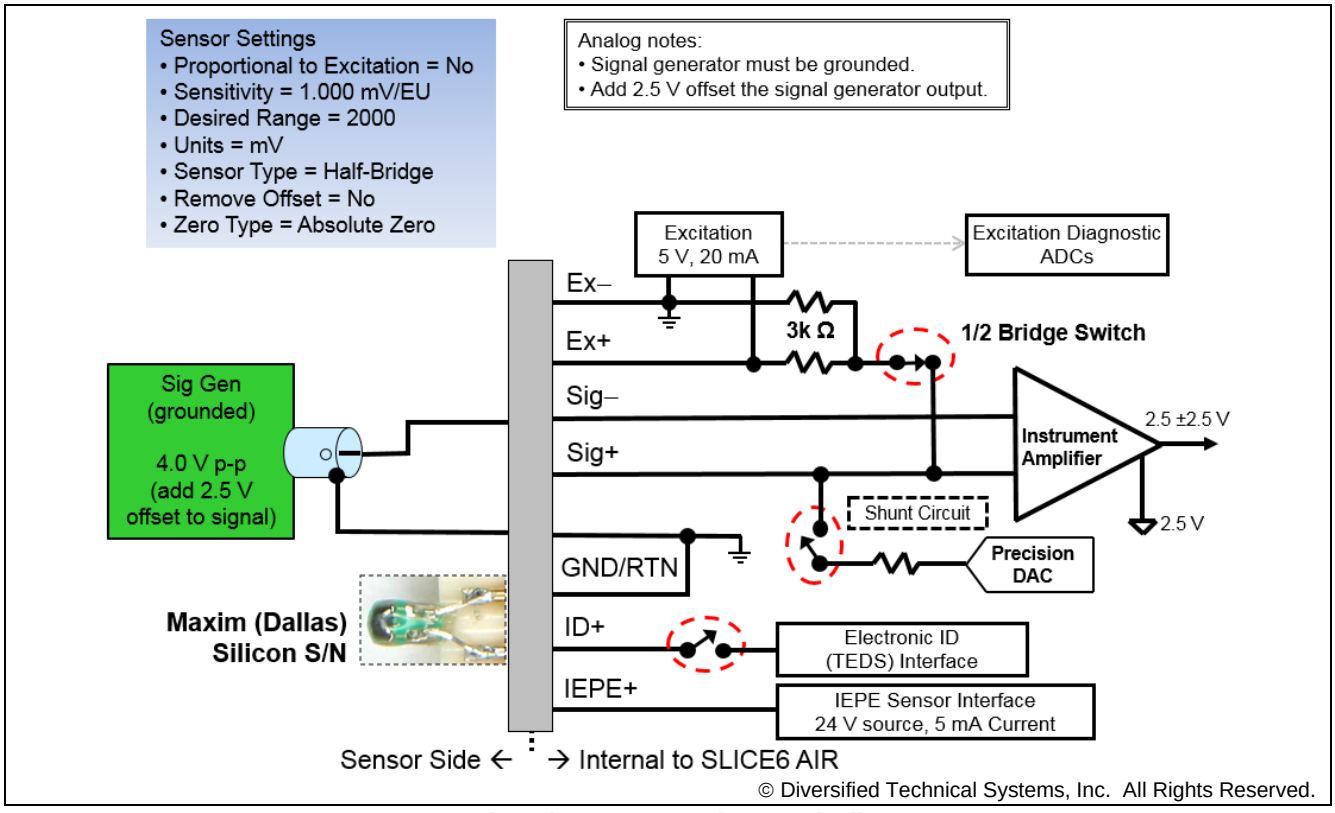
SLICE6 AIR Sensor Channel Architecture



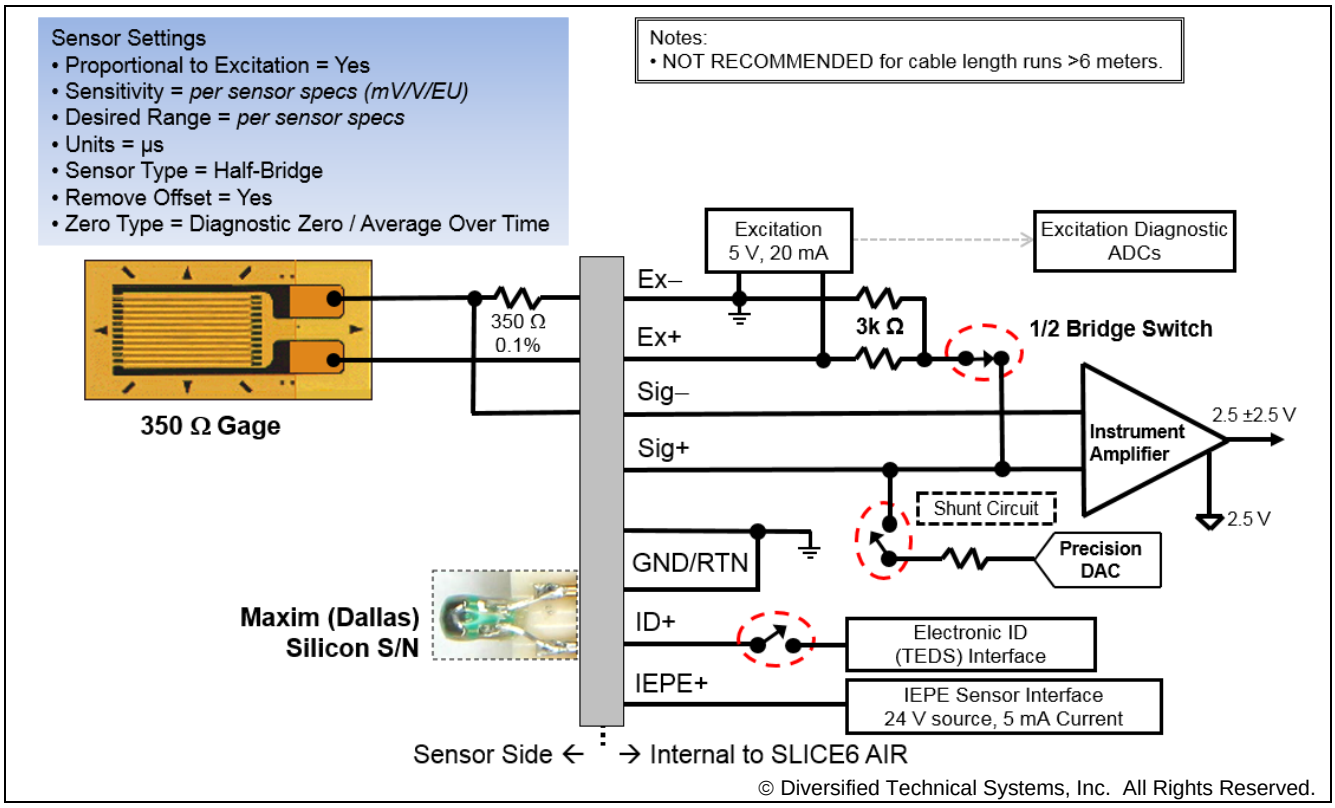
Bridge Input



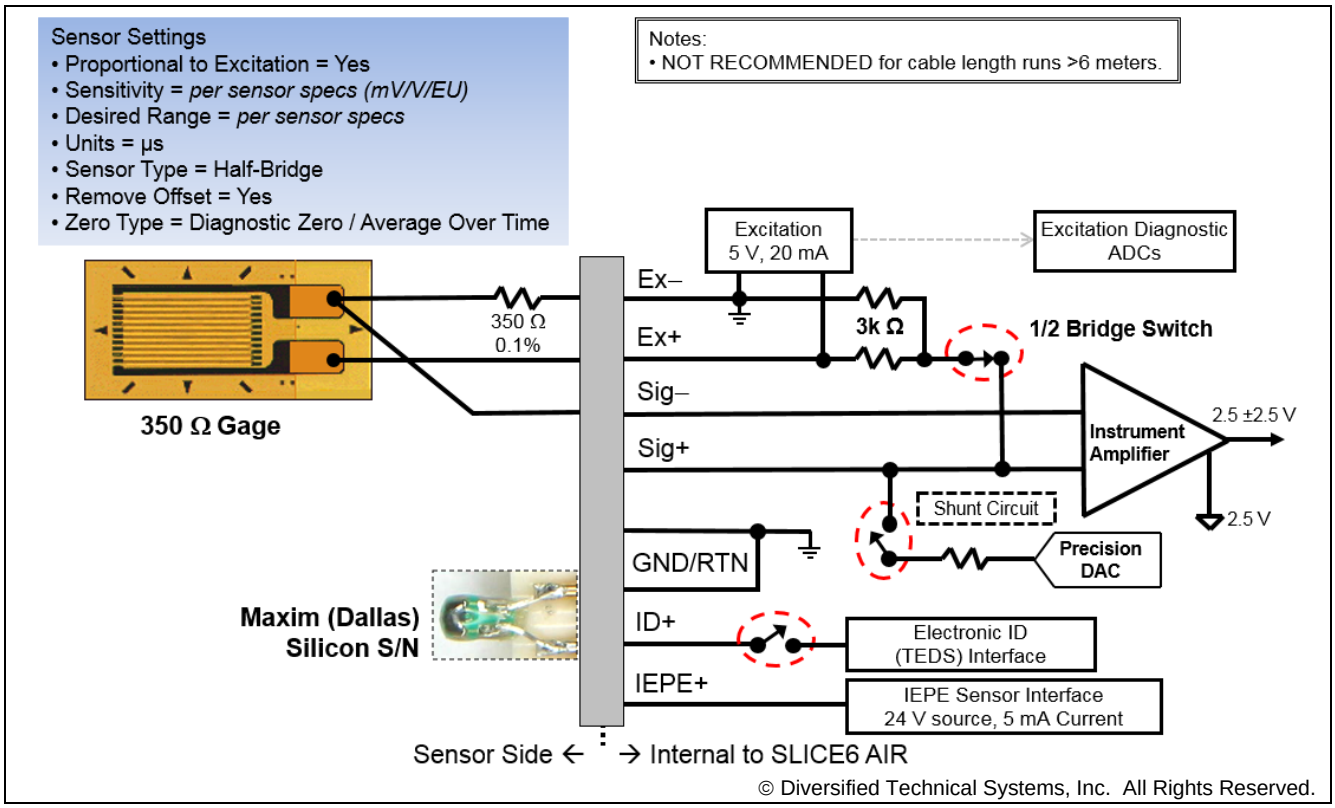
Signal Generator (floating)



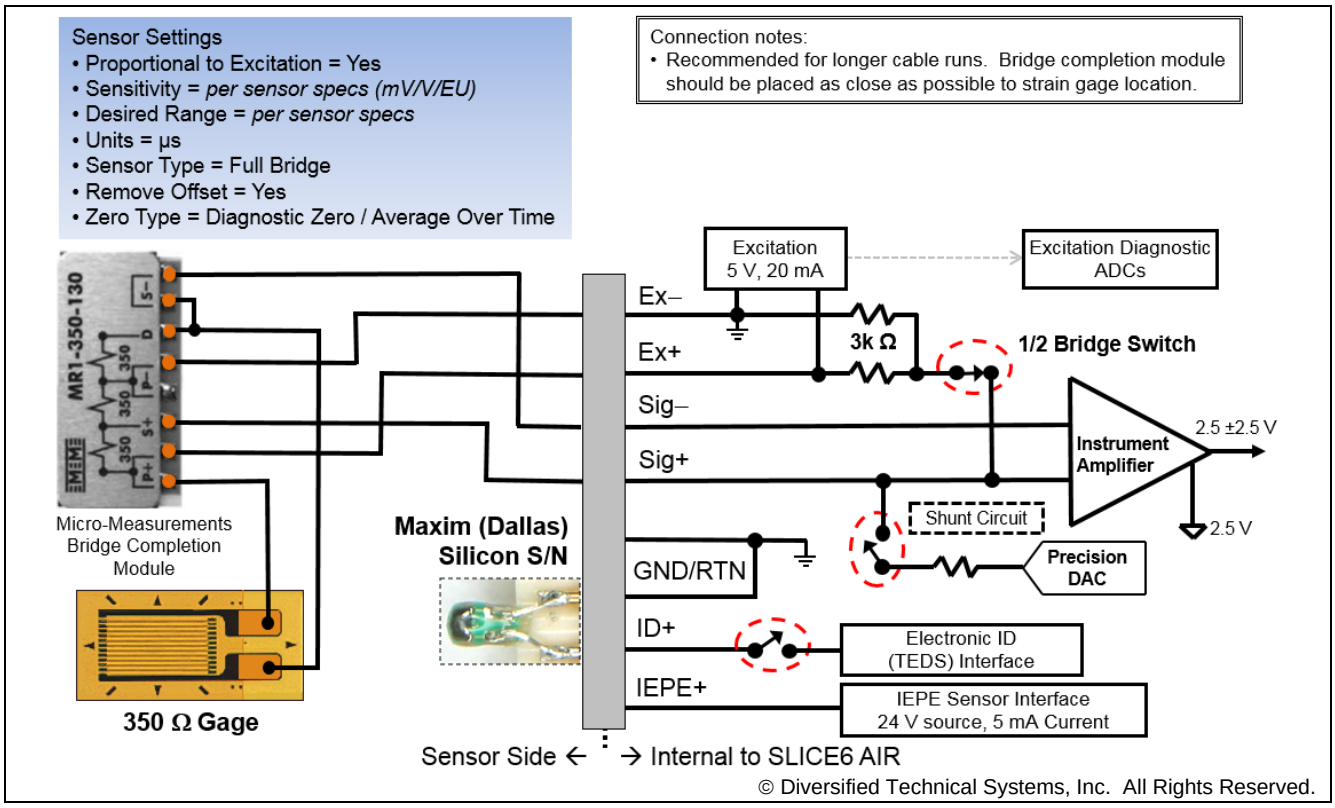
Signal Generator (grounded)



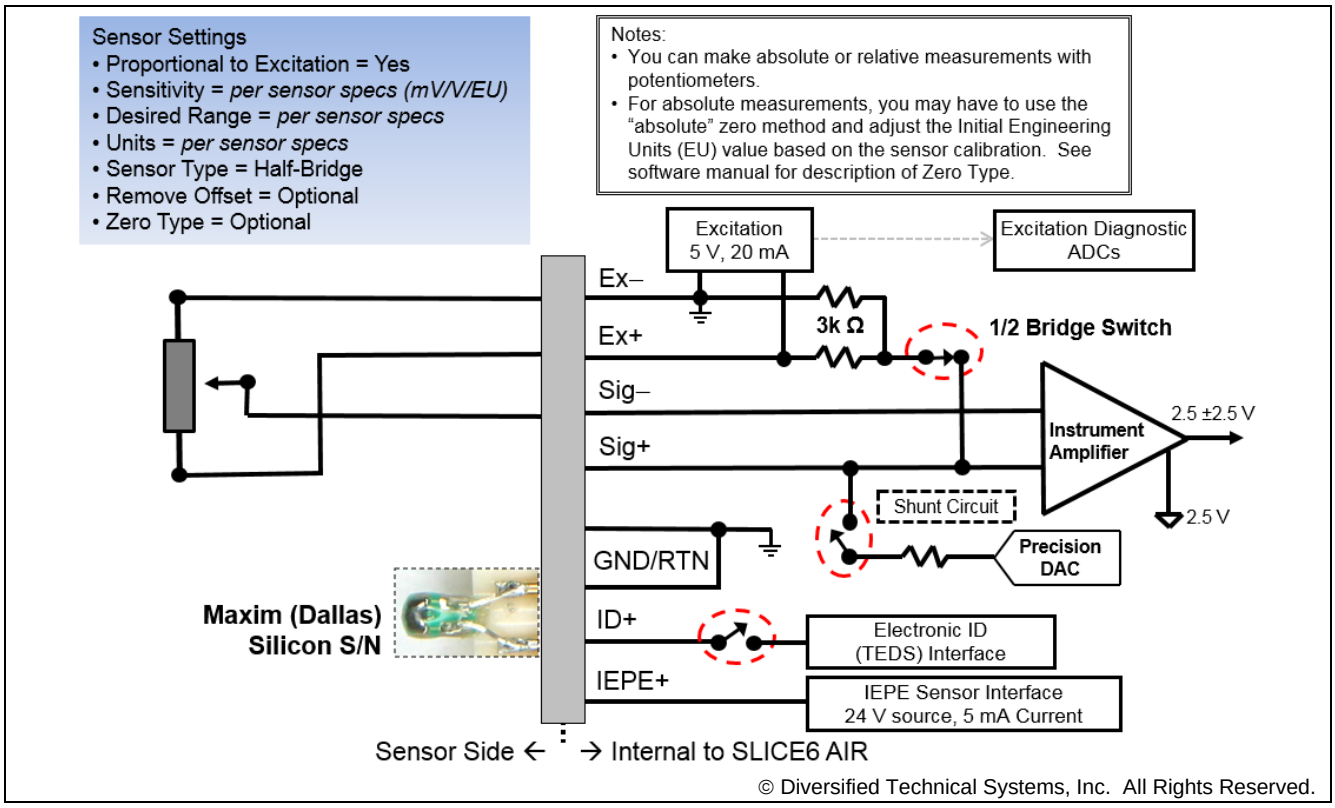
Strain Gage (2-wire)



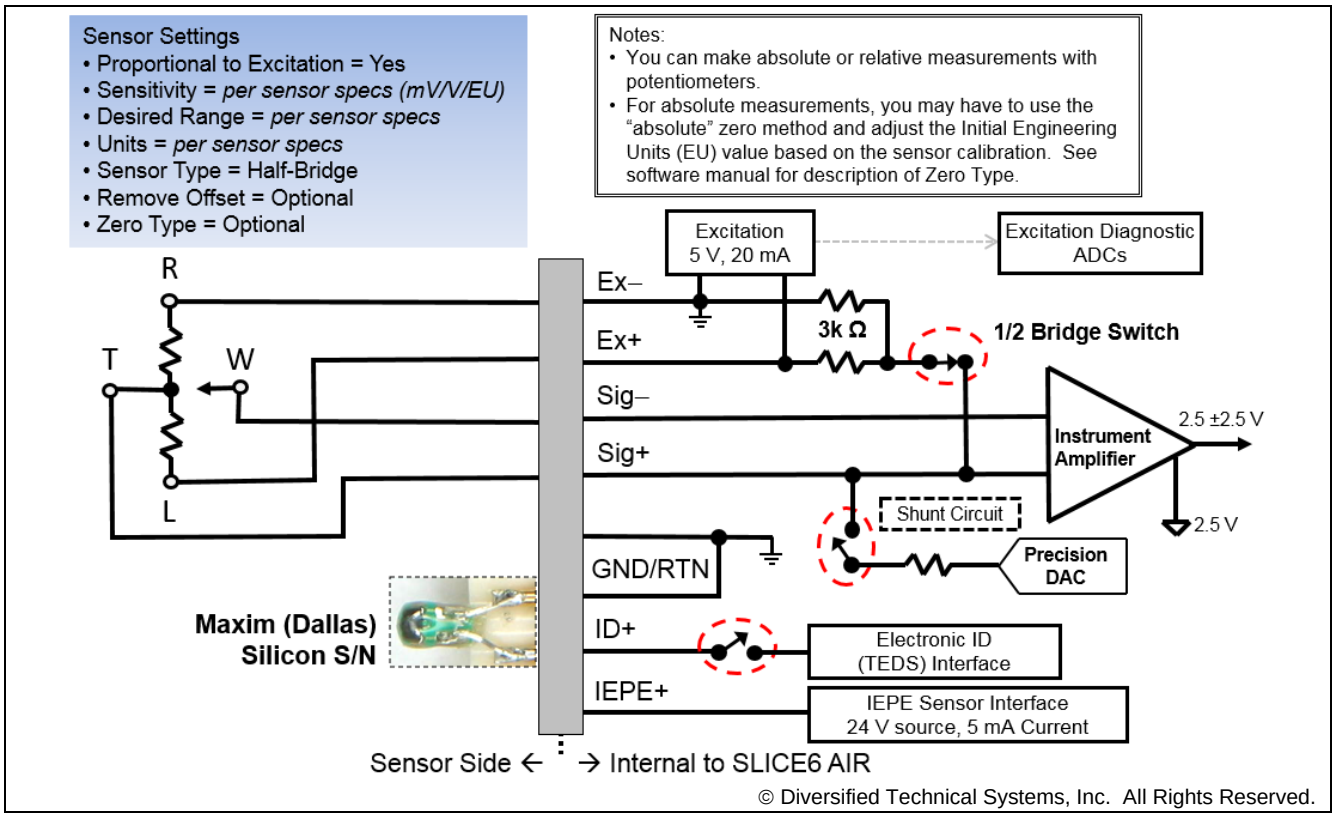
Strain Gage (3-wire)



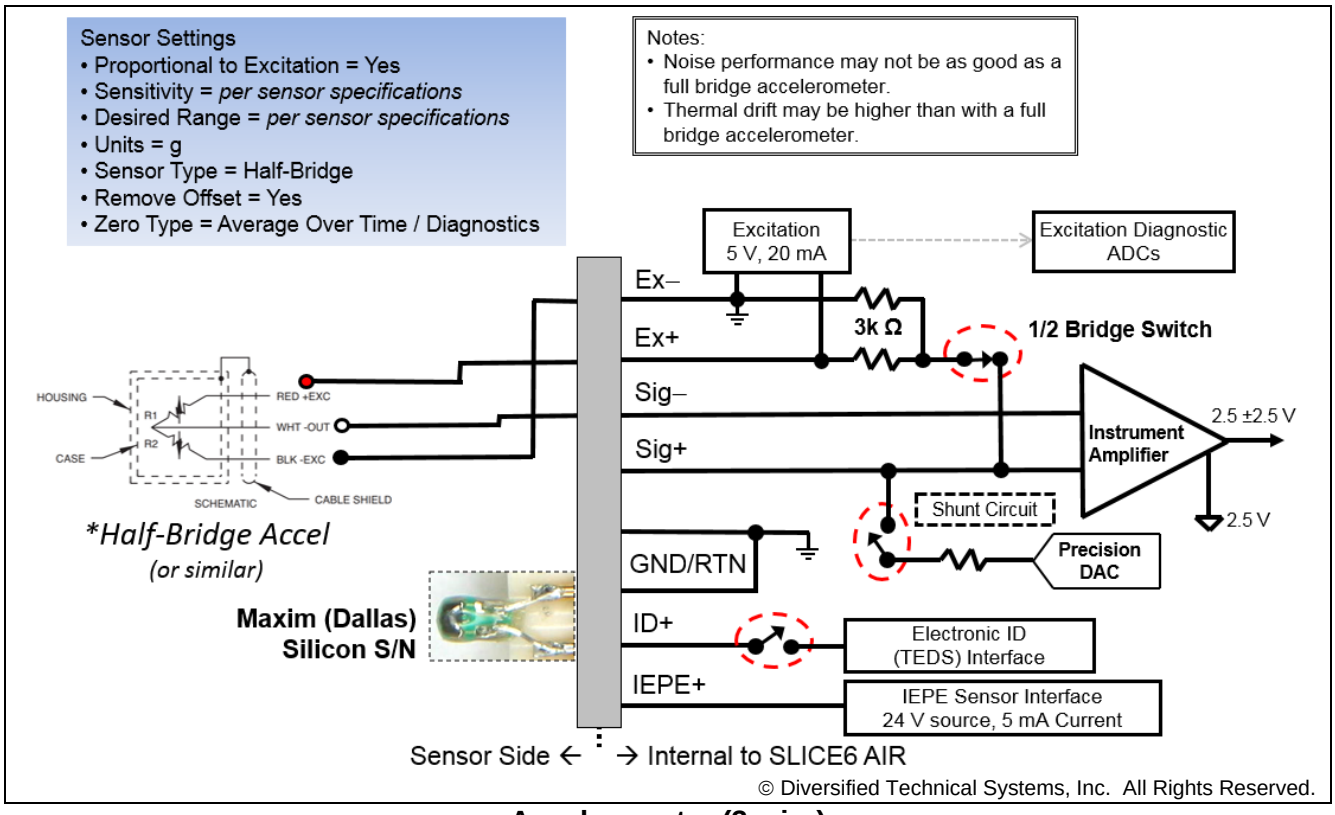
Strain Gage (full bridge)



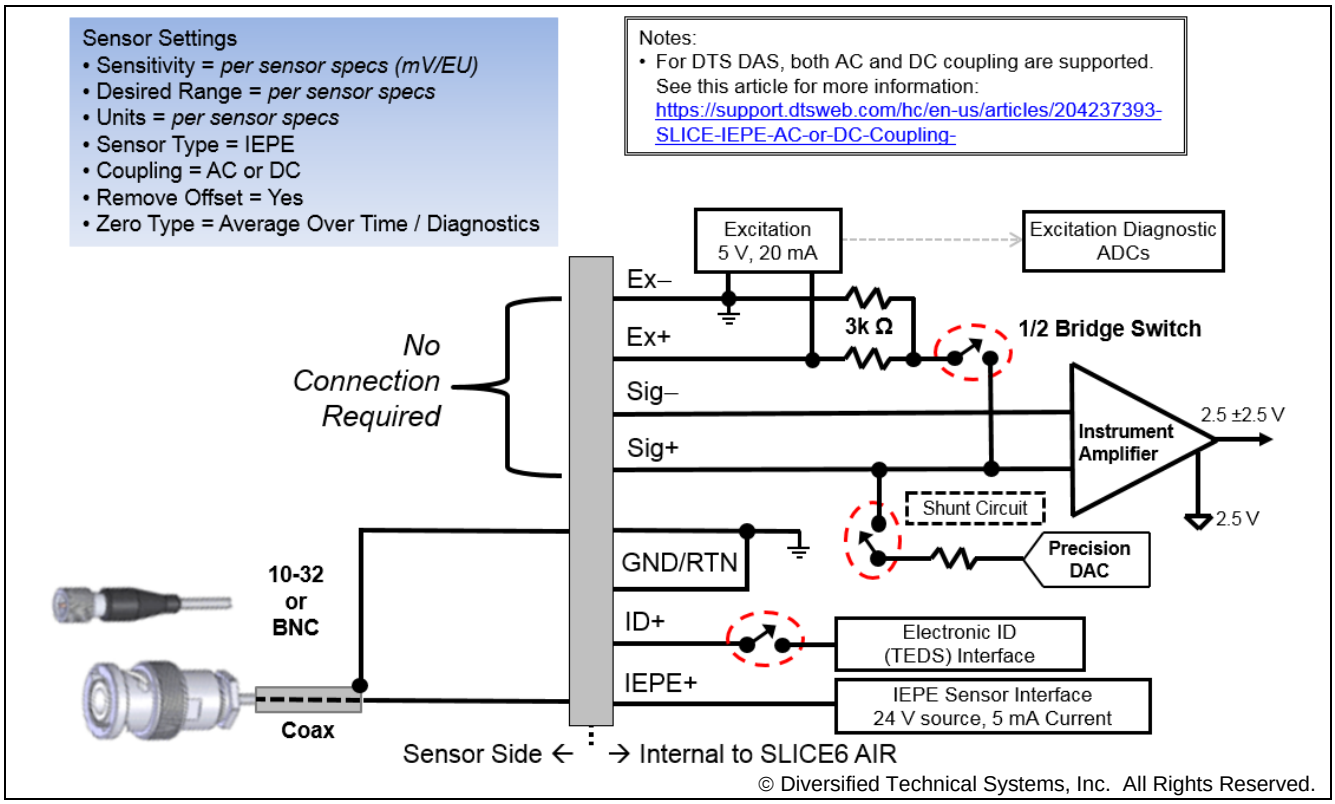
3-Wire Potentiometer



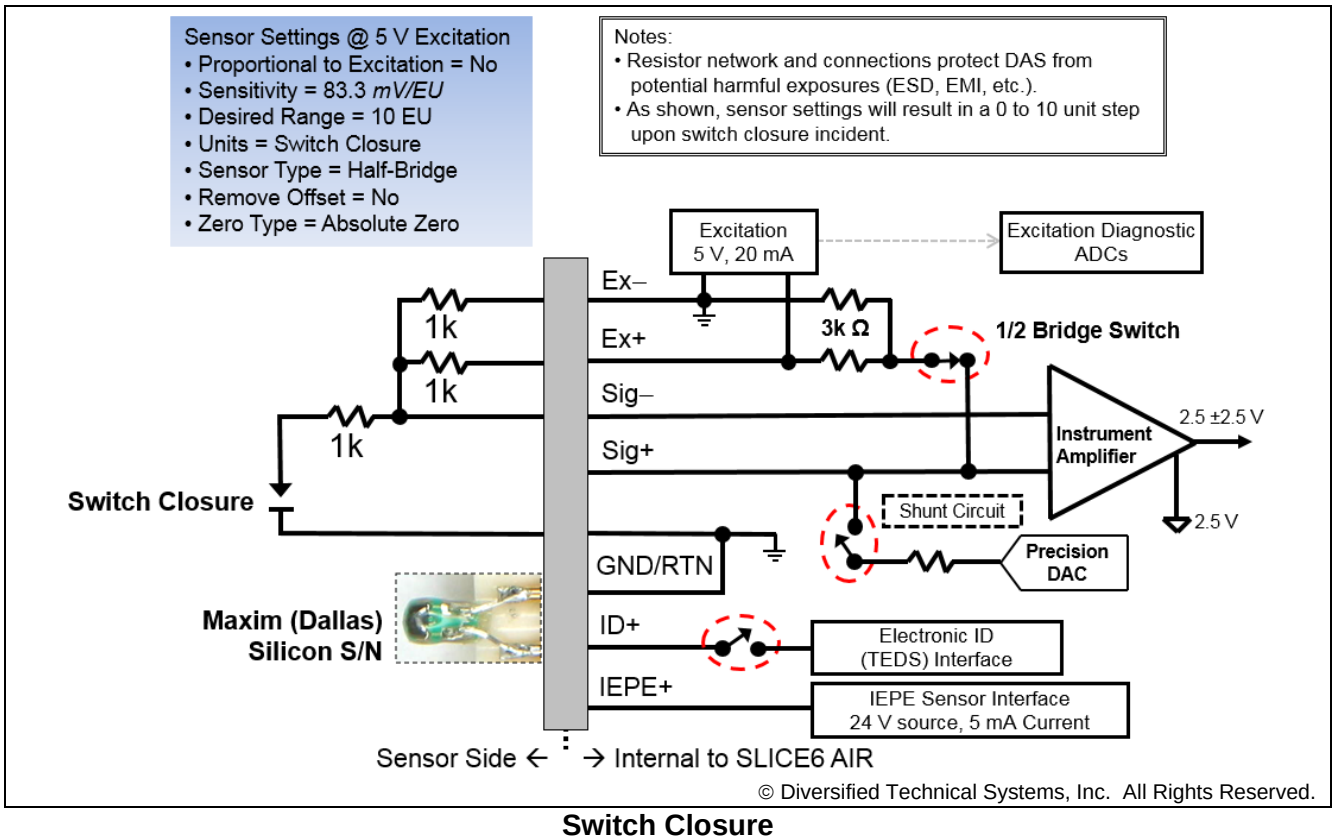
4-Wire Potentiometer



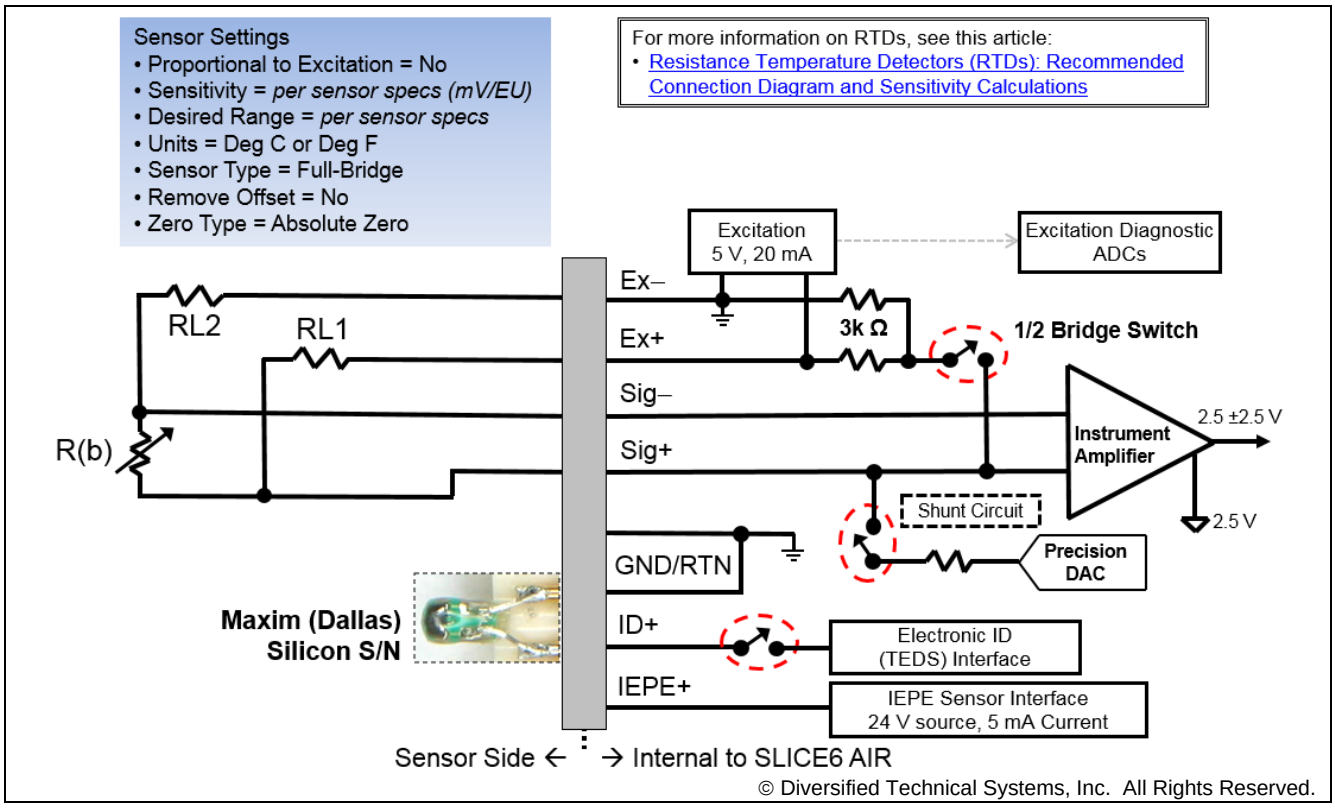
Accelerometer (3-wire)



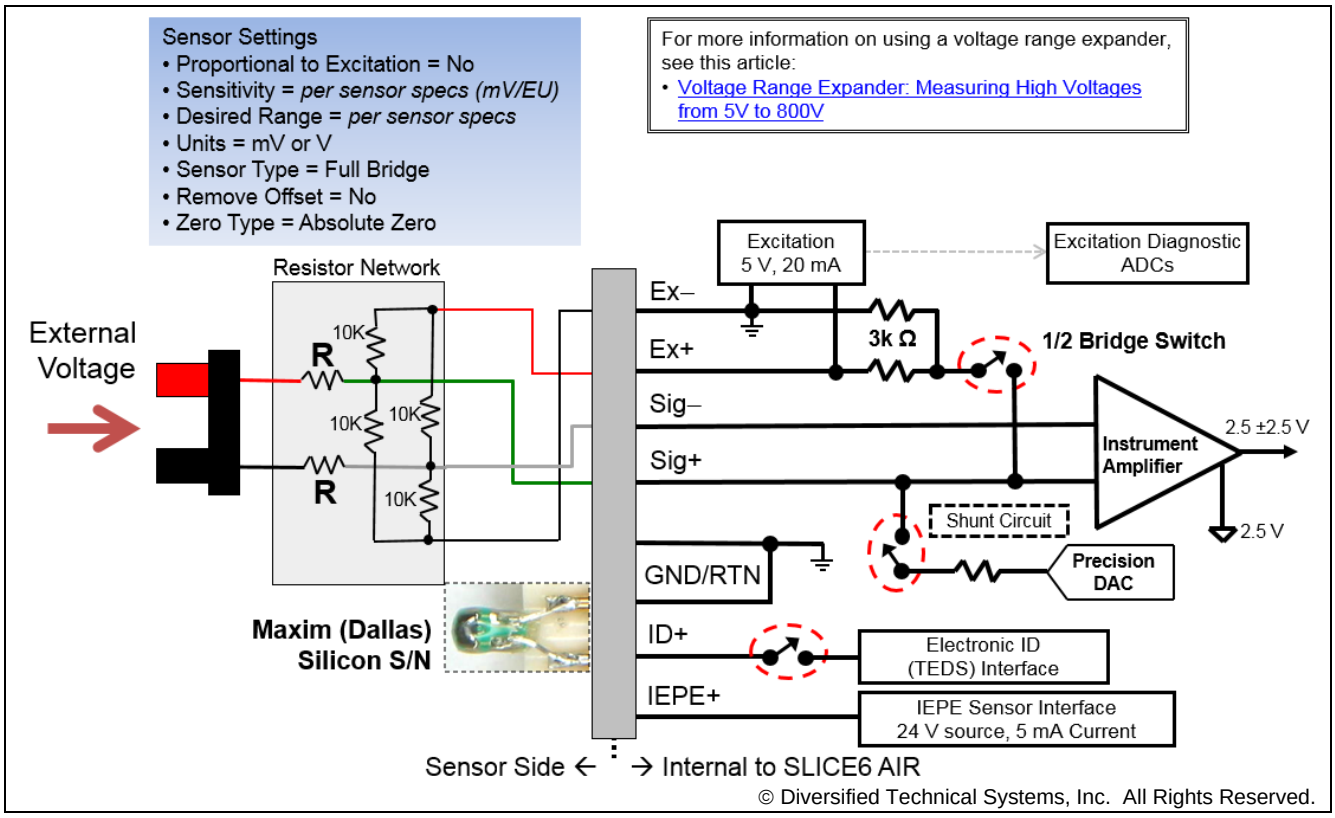
IEPE Accelerometer



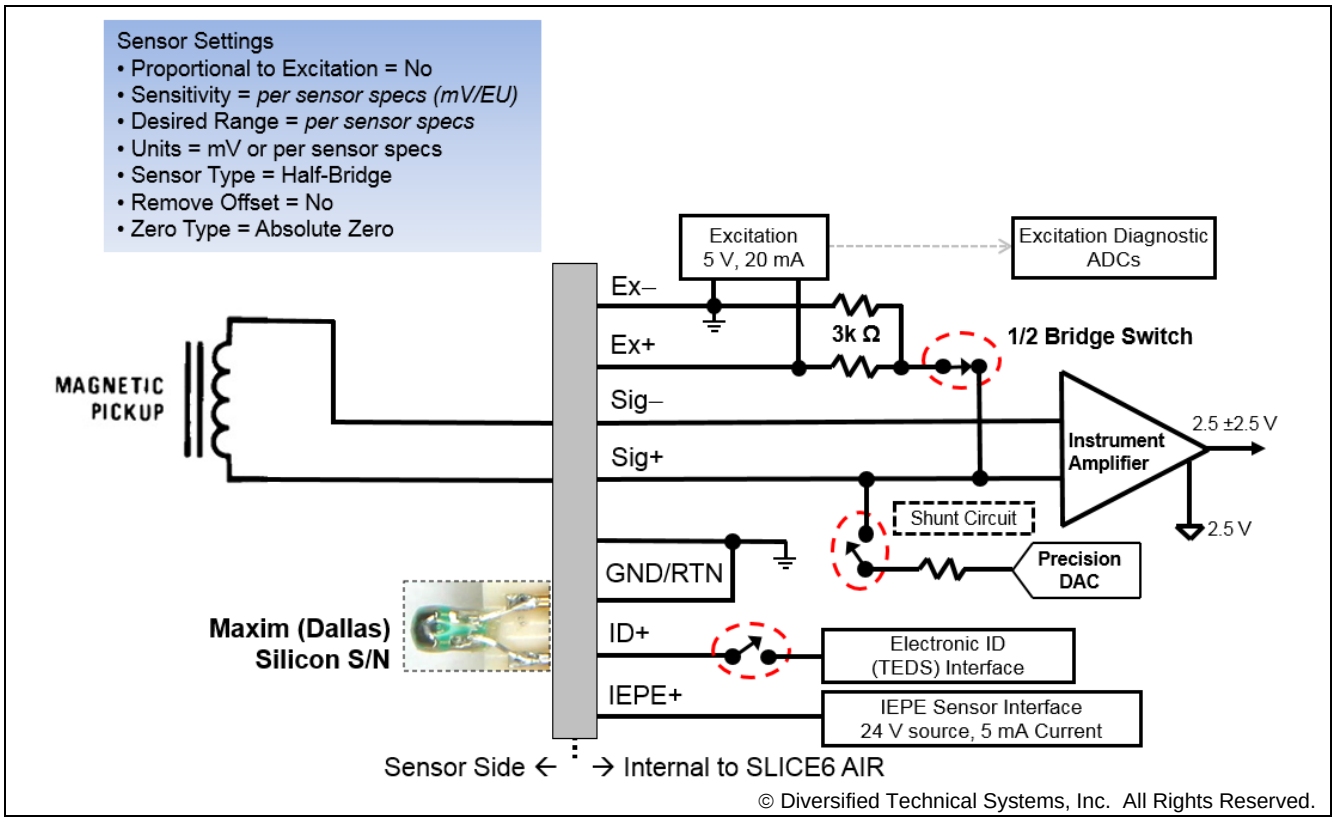
Switch Closure



RTD (4-wire)



Range Expander



Magnetic Pickup

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DECLARATION OF CE CONFORMITY

Description	Model
Data Acquisition Module	SLICE6 AIR DAS Module
Data Acquisition Module	SLICE6 AIR Rack

The undersigned hereby declares that the products listed above, manufactured by Diversified Technical Systems, Inc., Seal Beach, California, USA, conform to the following directive and standards:

Applicable Council Directive: **89/336/EEC – Electromagnetic Compatibility**

Applicable Harmonized Standards: **EN 55022:1998, EN 55024:1998**

Rollin White
Head of DTS, Senior Director

March 16, 2023
Date

Revision History

Rev	Date	By	Description
0	31 Jan 2020	EK	Initial release.
1	6 Feb 2020	EK	Changed max input voltage from 36 to 30 VDC and updated consumption data. Replaced PPS with 1PPS. Added 50 kHz spec to fixed hardware filter. Updated STS green LED to include data streaming.
2	23 Apr 2024	EK	Added EDR, DS-4, chassis isolation, IRIG-B detection specs, RS232/422 info. Expanded communication section and updated power/noise info. Added time synchronization info to power LED behavior. Updated shock rating from 3 ms to 4 ms.
3	11 July 2024	EK	Revised IP rating (was IP65; now IP64).
4	26 Sept 2024	EK	Revised pin 23 description for System connector from Ground to Chassis (page 30 and mounting drawing on page 21). Revised pins 3, 6, 13, 16, 21, 24, 27, 30 and 33 for Sensor connector from Ground/Shield to Ground (page 28 and mounting drawing on page 21).